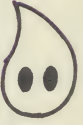


Gimix

Mar 78

Distributed by
GIMIX GHOST™ Products
(312) 927-5510
1337 W. 37th Place Chicago, Ill. 60609



GIMIX INC.



GIMIX GHOST

The GHOST is the GIMIX House Operating System Technology. It makes your system do what you tell it, or it does what you want without being told. The GHOST has a long memory: Commands may be entered up to one year before execution.

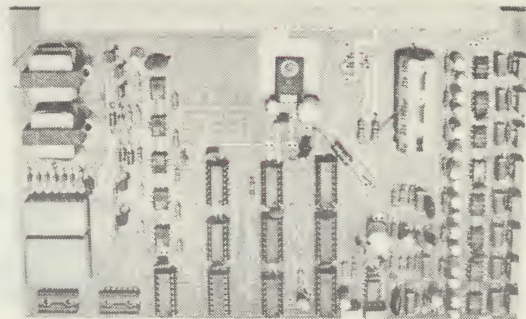
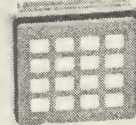
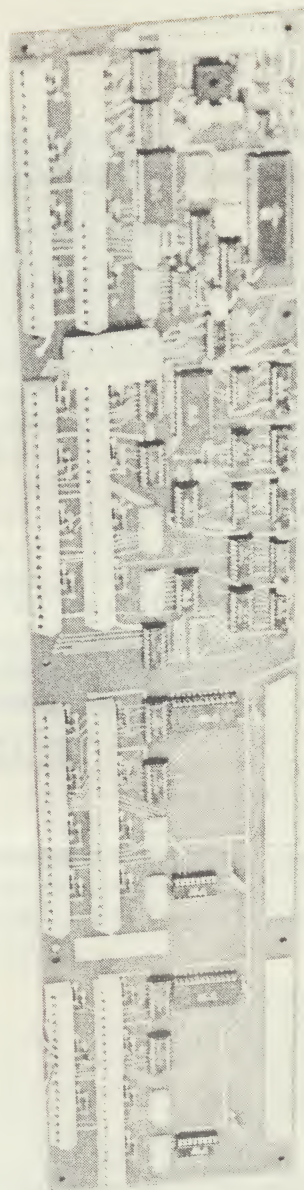
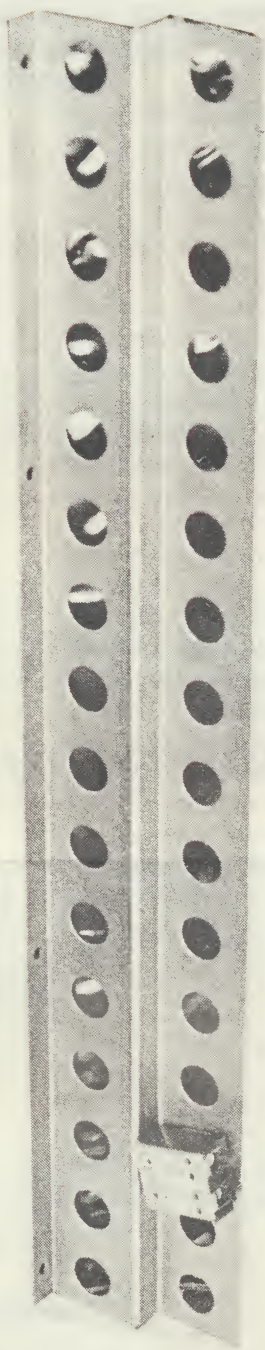
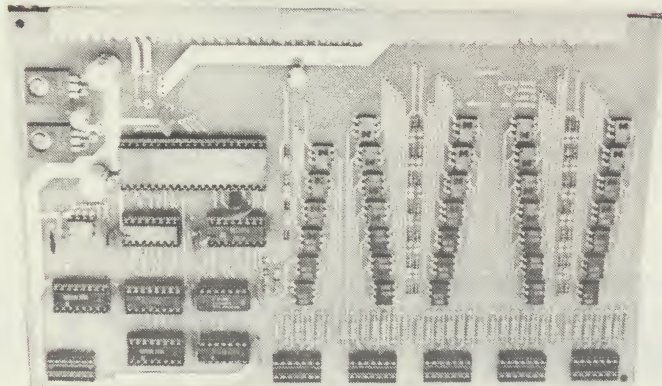
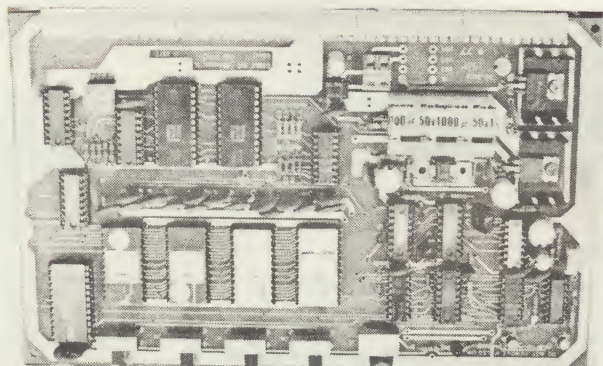
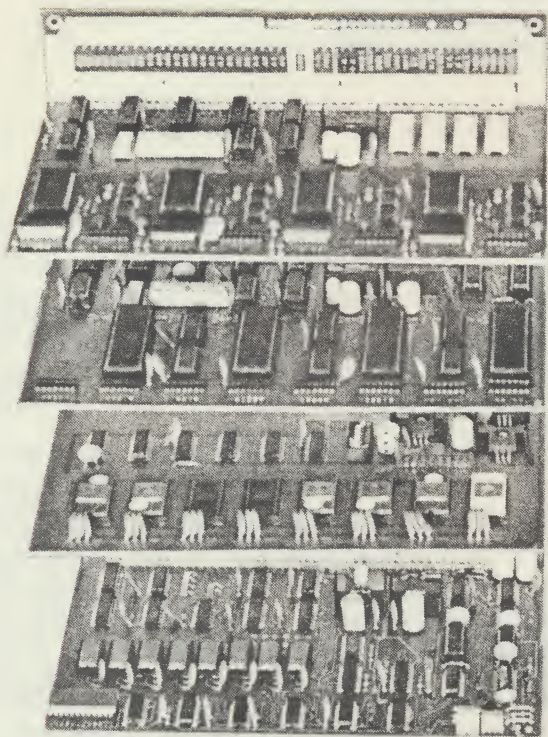
MULTI TASKING • Always available for switching • 2 or more users can operate 2 or more keyboards over 2 or more Video Channels at the same time.

SIMPLE TO USE • Anyone who can operate a pushbutton phone can operate this.
VIDEO BASED and designed so that every TV is a readout as well.

CONVENIENT • 16 button 2 wire keyboards can be easily wired anywhere and everywhere. You can operate Ghost from practically anywhere, not just at the computer.

FLEXIBLE • Can be used by a novice, or the most sophisticated hobbyist.
SYSTYMIZED • Customize your needs through component boards.
Can be readily expanded as your needs grow.

QUALITY • All boards assembled and tested-100%. Solder masked, using only top quality components designed for lowest power consumption and coolest operation. We take no short cuts to insure that we have the highest quality possible.



GIMIX GHOST BOARDS



- FOR DIRECT PLUG INTO SWTP SS 50 BUS.
 - ALL BOARDS SOLDER MASKED
 - ALL BOARDS ASSEMBLED & TESTED
- COMPLETE WITH MOLEX CONNECTORS.
- ALL NECESSARY INSTRUCTIONS AND DOCUMENTATION INCLUDED.

CPU BOARD

Includes Xtal controlled 6800 CPU, baud rate generator for 110-9600 baud (Separate Xtal), 6840 programmable timer, 6810 RAM (128 bytes), four sockets for 2708 PROMs. DIP switch-selectable addressing (including E000/FC00 dual access for MIKBUG®). Fully buffered address and data buses. DMA capability through cycle-stealing or Halt.

16K STATIC RAM

Uses thirty-two TMS4044 fully static RAMs, for 16384 bytes in four 4K blocks. Each block has its own DIP switches for disable, write protect, and addresses (to any 4K boundary). Each block is also SOFTWARE PROGRAMMABLE — can set disable, write protect, and address to any 4K boundary. This allows expansion of memory beyond 65K, or multitasking with just one 16K board, with little software overhead. All registers included — no phantom lines needed. Also includes four 7805 voltage regulators. Current: 2A max.

4K PPD

4K PROM board, with built-in programmer and duplicator, holds four 2708s (one included). Master switch removes power from PROMs, allows insertion/removal without shutting down computer. Separate write protect switches, one for each PROM. All four PROMs are written at the same time, but are read separately. DIP switch addressing to any 4K boundary. One pre-programmed 2708 included, contains writing and testing software.

SERIAL INTERFACE

Includes four 6850 ACIAs. Four ports, RS232 or 20 mA current loop. DIP switches select baud rate, separately for each ACIA. DIP switch addressing to any 8-byte boundary.

PARALLEL INTERFACE

Includes four 6820 PIAs, and clock/timer (1 second and 1 minute outputs). Eight ports — 3 buffered for output, 5 can be in or out. DIP switch addressing to any 16-byte boundary.

VIDEO BOARD

Ultra high speed output. Generates 16 lines by 32 upper case characters. (Jumper selector for 16x64 for use with 10 MHZ video monitor.) Dual port 1K (1024 bytes) RAM (can be jumpered to the beginning of any 1K memory segment) which the processor can read or write as though the memory was part of the system. Instantly displayed as written. Text scrolling and cursor generated by software. (Display driver software available.) Full interlace EIA video output (crystal controlled). Adjustable density and left hand margin. Designed for use on a master antenna system so that any TV on premises becomes a readout for the computer. More than one Video board per system can be used.

8 K EPROM

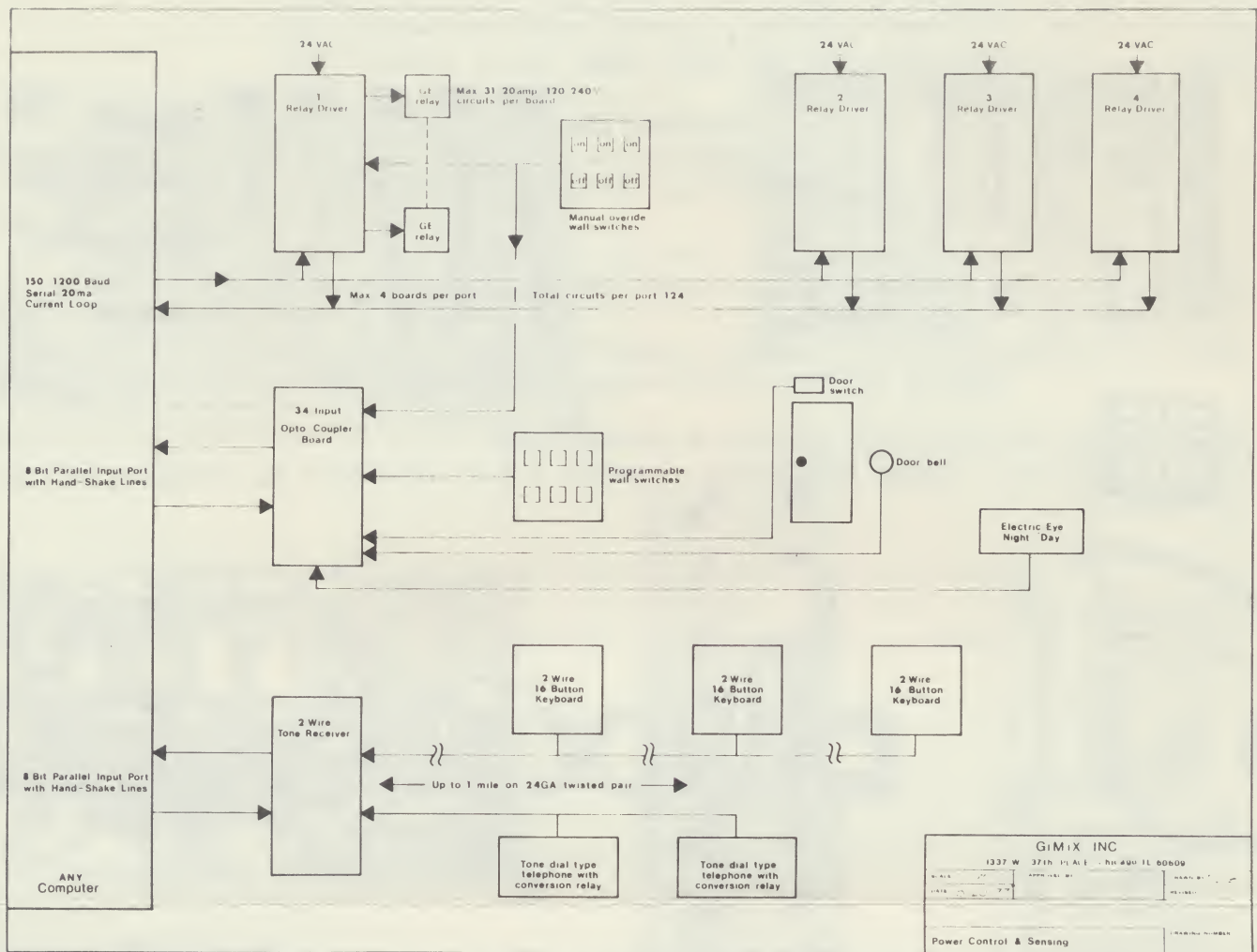
Uses 2708 UV EPROMS (not included). Dip switch addressable to any 8K memory boundary. Can be addressed to E000 to replace MIKBUG® using your own system monitor. Instructions included for minor CPU board modification when used for this.

MOTHER BOARD

13 full size SS 50 bus. Fits SWTP mainframe. Ideal expansion board, or for those users who need or will be needing a larger system.

EXTENDER BOARD

For ease in trouble shooting or prototyping. Raises any SS 50 board up 6½".



Boards For All Computers

RELAY DRIVER

Each board drives 31 G.E. RR8 relays (UL approved, split-coil, 24V, mechanical latching, control up to 20A each relay). Accommodates manual override switches. When commanded by computer, board scans relays and reports on/off status. Connects to computer via 20mA serial current loop. Up to 4 boards can be on one port. Size: 24 x 5 in.

BRACKET

designed to hold 31 relays. Bracket and board and transformer will fit in a 30" high x 12" wide x 6" deep standard electrical cabinet (24" wide for 2 boards & Brackets; 36" for 3).

20 VOLT TRANSFORMER

powers board and drives relays.

16 BUTTON KEYBOARD

Ideal for multi-point remote control. Has 16 push buttons. 0 through 9, *, # and A, B, C, D. Any number of keyboards can be connected on 1 pair of wires. Lockout feature — while 1 is being used others on pair of wires are locked out. Imagine, — only 1 pair of wires need be connected to computer from these keyboards located anywhere on the premises. We have tested these over 1 mile of twisted 24 gauge phone wire, and they worked perfectly.

PHONE CONVERSION RELAY BOARDS

Converts DTMF tones into binary. One per system required. Allows you to use tone buttons on phones (with our conversion boards) or our 16 button keyboards. Connects to 8 bit parallel input port.

PHONE CONVERSION RELAY BOARDS

allow you to convert your private phone system into computer terminals also.

OPTO BOARD

Has 34 input opto isolators. Each opto has its own current limiting resistor that allows from 5 to 24VDC input voltage. Self scanning. Built in switch debounce. On board 64 byte FIFO buffer memory. Connects to any 8 bit parallel input port with handshake lines. Contains + 5 and - 12 voltage regulators. All I/O lines fully buffered.

NOTES

On the front panel you will find the PAGE, TEST & POWER switches. POWER switch in, turns the GIMIX on. PAGE switch in will call computer once, out twice. NOTE: If the POWER is on, pressing the PAGE switch will institute the dialing sequence. To stop a cycle turn POWER off and wait 10 seconds before turning on again.

The GIMIX Auto-Page must hear a beep tone from the paging terminal to assure that it has completed its cycle. If your paging terminal does not answer with a beep tone, please contact factory for a special model. If it is being used to call another phone, a beep tone can be simulated by pressing tone buttons 1 & 4 together of phone being answered.

In case of trouble, the device must be immediately unplugged. The factory warranty provides for repairs.

Registered terminal equipment may not be used on party lines or coin telephones. Notification must be given to the telephone company:

- A. The particular line being connected to.
- B. The FCC Registration Number.
- C. The Ringer Equivalence.
- D. Make, Model and Serial No.

The above information will be found on the Label.

LIMITED WARRANTY

GIMIX Inc. warrants this unit against defects in material and workmanship for Ninety Days. During this period GIMIX will repair or replace it without charge.

After this period, GIMIX will repair this unit at a reasonable charge. If the cost to repair it is more than \$35 we will notify you before repairing. This warranty does not cover damage due to accidents, negligence, abuse or tampering.

Send the defective unit Prepaid to:

GIMIX Inc.
1337 W. 37th Place
Chicago, Ill. 60609

Please enclose a letter explaining what is wrong and advising us where to ship the repaired or replaced unit. We will prepay the return shipping cost.

WE ARE PROUD OF OUR REPUTATION FOR QUALITY.

Please — if you have any questions regarding the use or operation of this unit that your dealer can't answer, please contact us.

GIMIX INC. 1337 W. 37th PLACE, CHICAGO, ILL. 60609
(312) 927-5510

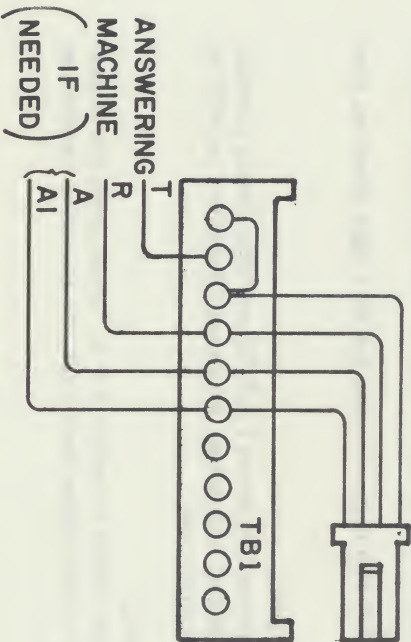
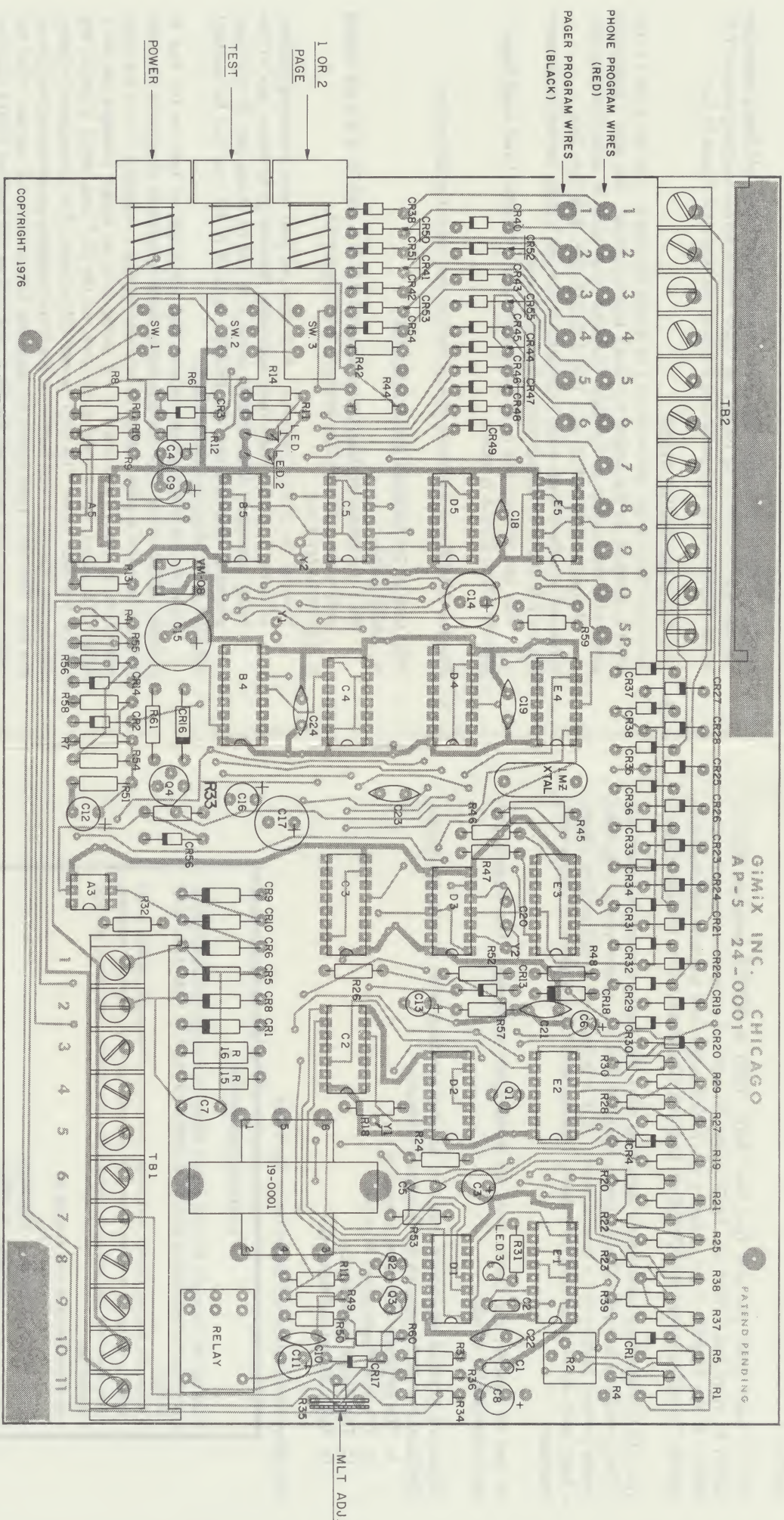
GIMIX AUTO-PAGE INSTRUCTIONS

Mr 78

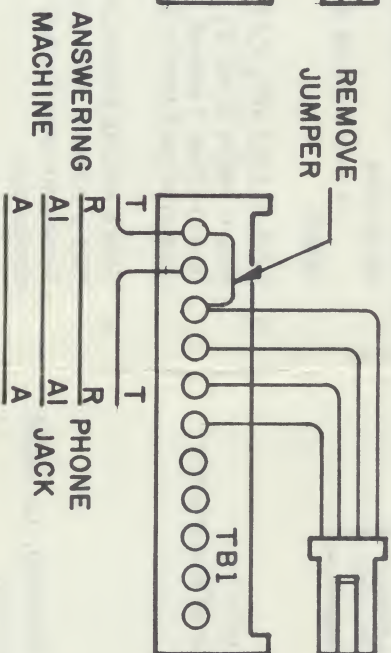
1. Plug the GIMIX into a grounded outlet. Leave power switch off. Static electricity will damage the GIMIX so be sure to touch chassis before touching wires or P.C. board. Remove cover by unscrewing 4 rubber feet and slide chassis to rear.
2. TO PROGRAM PHONE WIRES.
Terminal Block 2 has screws from 1 to 0 plus SP (spare). Use the 7 (or 11) red wires to program in the paging terminal's phone number. Red wire 1 goes to the screw with the number of 1st digit. Continue other wires in order. For example:
If number is 927-5510, wire 1=9, 2=2, 3=7, 4=5, 5=5, 6=1, 7=0.
If needed, use the 6 black wires to program in the user's pager number in the same way to T.B. 2. Put unneeded black wires on SP screw.
You can also use any or all black wires with a Selector Level voice Pager to identify which GIMIX is paging.
3. Plug the GIMIX into the phone jack of the line you want it to call out on.
4. FOR USE WITH ANSWERING MACHINES
A. SAME LINE.
Wire the answering Machine to screws 2,4,5, & 6. (NOTE: 5 & 6 are needed only when used with Key phones.) See Diagram 4A.
B. DIFFERENT LINE.
Remove the jumper between 1 & 3. Wire red lead from answering machine to screw 1. (Other leads from answering machine go to phone jack of line being answered.) Wire GIMIX screw 2 to red of phone jack of line being answered. See Diagram 4B. (NOTE: leads A & A1 may not be needed.)
ADJUST MLT (Message Length Time).
Measure the user's announcement plus the length of time for the Vox to dropout. (That is the time the answering machine takes to disconnect from the phone line when a caller hangs up without leaving a message.) This is the minimum time to set. If you want to be paged only on longer messages, set MLT longer. To adjust, use a small screwdriver on the MLT pot, which is behind the hold in the back panel. The MLT turned CW is longer. For convenience in timing this setting, the MLT Test button on the front simulates an answering machine on the line. The MLT light comes on when the timed interval is reached. After the answering machine hangs up, the MLT light will go out and the GIMIX will then do its thing.
To test, press the MLT Test button in until the MLT light comes on, then release.
5. FOR ALARM APPLICATIONS
Wire normally closed dry contacts to screws 7 & 8. To use: When circuit is broken for more than 2 seconds, dialing commences. An answering machine can NOT be used when the GIMIX is wired this way.
6. FOR MANUAL SIGNALING
Wire a normally open push button to screws 7 & 8. To use, press and release. Cycling the page button will also trigger the GIMIX. An answering machine can also be used.

GIMIX INC. CHICAGO
AP-5 24-0001

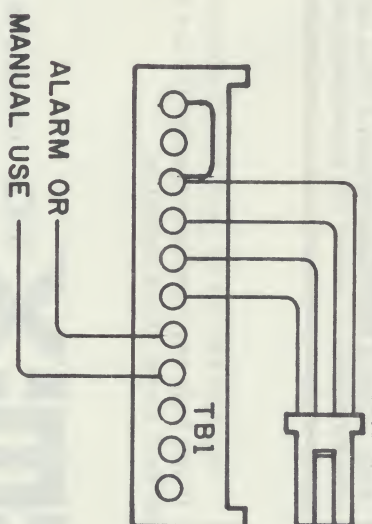
PATENT PENDING



4A SAME LINE



4B DIFFERENT LINE



5 & 6 ALARM OR MANUAL USE

Electronics buff, realty broker put gimmicks to work

By Laura Green

Robert Phillips loves electronics, remote control devices and designing circuits in his daydreams. He hates inventory and accounting.

Richard Don knows how to make a business run. And he loves gadgetry and electronics.

Their match was made in Bridgeport where Phillips, the 25-year-old electronics wizard, and Don, an industrial real estate broker, operate Gimix Inc., which manufactures, well, gimmicks.

These are not cheap little doodads, but costly computerized devices like the system that allows messages recorded by a phone answering machine to be picked up by telephone. Another, packaged in an orange coffee cup, goes "bink, bink, bink" ("just like a turkey in love," said Don) instead of "ring, ring ring," when a call comes over the telephone.

The most ambitious device, scheduled to go into production next year, is a home minicomputer designed to trigger any electric appliance in a house, function as a calendar by displaying your appointments for the day on a television screen, wake you in the morning, store recipes, check homework, turn on the lights, open the garage door and program your alarm to buzz you when your favorite late-late television show is about to come on.

"I'm going to make one that can read those bars on the food you bring home from the grocery store and keep a record of the things you need to buy," Phillips said.

Phillips can not remember when he was not fiddling with remote-control electronics. "He took his first television set apart when he was 3, and he designed his first apartment remote-control system before he was old enough to drive," Don said Phillips' mother told him.

Phillips never did finish high school. "I dropped out when I was 16," said Phillips, who sat in classes ignoring the math teacher and daydreaming about circuitry. "I kept telling

my mother I'd never make it through school," he added.

He later went to work for the telephone company as an apprentice in the PBX and Picturephone divisions. Later he sold private phone systems, repaired some electronic devices and designed others.

Phillips automated his own apartment, adding such personal touches as a remote-control record selector operated by push button.

He met Don while he was designing an elaborate home remote control computer house-boy. The system, built for a Chicago area home, can heat the water in the indoor swimming pool, turn on lights in a programmed sequence and control heating, ventilating air-conditioning and security surveillance devices. The computer is linked to a telephone so it can be given directions from by phone. Phillips is currently setting up a remote-control service cart that is guided by wires buried in the floor of that house.

While the system was still under construction, Phillips had to call the telephone company about a problem in the com-

puter system, which was triggered by push-button phones. The phone man didn't believe the young inventor. His boss didn't believe Phillips. His boss' boss was incredulous. He

brought first one, then another, then another supervisor around to see Phillips' handiwork.

And he also offered to take him back at the phone company.



GIMMICKS are produced by Richard Don (left) and Robert Phillips for firm they call Gimix, Inc. These circuit boards are part of a telephone paging system (Sun-Times Photo by Pete Peters)



MARTHA LEONARD

Nov. 29, 1976

Vol. 6 No. 22

People

Lookout CONTINUED

Bob Phillips likes to push buttons. "I've always been fascinated by remote control devices," says the 25-year-old inventor whose Chicago apartment is so automated that he can select a record for his stereo by punching a few buttons on his Touch-Tone phone. Last fall, with a \$10,000 investment, he launched Gimix, Inc. which distributes his electronic gadgetry to more than 70 dealers in the U.S. and Canada. One of his products is a system which allows messages recorded on an answering machine to be retrieved by phone. His most impressive invention to date is an elaborate system he designed for a friend's home which —by signals from a hand-held trans-

mitter or Touch-Tone phone—can open the garage door, warm up the water in the pool and start the dishwasher, among other things. A high school dropout with no formal electronics training, Phillips worked briefly for the phone company installing PBX machines and later went into business as a free-lance contractor. His newest invention is a microprocessor (or small computer) which controls all home appliances. "It can wake you up in the morning, turn on the TV set and then tell you the things you have to do that day," explains Phillips. He hopes to unveil his system at the Consumer Electronics Show in Chicago this winter. The price tag? \$5,000. □



Dear Dealer:

The prototypes of our CPU boards are in and working. Enclosed is a parts layout so you can see the features.

Our main frame is in the final design stages. The cabinet will be 21" x 18" x 7" and be able to hold 2 mini floppys as well as the mother board and power supply.

The mother board will hold 15 50-pin and 8 30-pin boards and will have DIP switch addressing.

The power supply has a Ferro - Resonant Constant Voltage Transformer capable of operating from 90 to 140V A.C. and rated at 20 amps @ 8V, 5 amps @ + 15V and 5 amps @ - 15V.

We plan to have the above in stock for deliveries by March 1.

Concurrent with that we should have an APL Interpreter. Please note that our system has been designed so that it can be used with any software. We believe the extra dollars spent on the flexibility are worth it in order to have a system that won't be outdated if better software becomes available.

We will start shipping the 16K RAMs and Tone Receivers within a few weeks, as soon as documentation and testing is complete. All parts are in.

All other items are currently in stock. The supply of 4044's will limit our capacity of 16K RAMs, but we anticipate no delivery problems on anything else.

Please read carefully the attached on the 16K RAM. This board is not designed to be competitive with other RAMs and it would be wasteful to put it on a single-user dedicated system. All parts have been tested, and the 4044's have gone through 3-stage testing that is the equivalent of 291 days of use. We feel this board is necessary for multitasking or where you want to protect blocks of RAM from being written accidentally.

Also enclosed are some of the applications we are preparing on our power control system.

We hope to have in a month our GMXBUG Monitor. This will bring the Video board into the mass market. The minimim system as described in the enclosed project outline using the SWTP kit should enable you to sell a complete system for slightly more than the Pet or TRS-80, but give the user a lot more value and be expandable.

Our 4K P.P.D. has been a hot item. But you have to tell your customers it is available. One other point on this. Please bring it up front. Too many techs have kept it in back to burn their own. It has also generated a lot of sales for our 8K PROM board, as the user buying this ends up burning more PROMs and needs more PROM holders. You can now sell eight 2708's and our 8K board for a price close to 8K of RAM to those users who want to turn key their routines.

One final note. We're all in business to make money. To do this you must Sell - And to sell you must let your customers know what you have, and show and demonstrate your merchandise. We have been directing prospects to our dealers. Those that have been showing and displaying our boards have been coming back with repeat orders, and been making a profit on our items. You all know by now our marketing policies. Now it's your turn - We want you to show and sell our boards. You know that we have a back-up stock and our shipping has been great. We want your business and ask for your order.

Best Regards,

GIMIX INC.

Richard Don

May 78



1337 W. 37th PLACE, CHICAGO, ILL 60609 (312) 927-5510

LOW VOLTAGE SWITCHING SYSTEM

Most homes are wired by running 110 volts from the light being switched to a wall switch and then to the breaker panel.

However, if you want 2 switches to control the same light or function then you must run an extra 110 volt wire in conduit from each switch. At this point relays become cost effective and necessary.

A relay can be controlled from any number of switches. You wire the light to the relay and the relay to the panel using 110 volt wire. The control wiring to activate the relay is 24 volts, and uses bell wire.

The G.E. RR8 Relay is powered only at the time of switching. It then stays mechanically latched at the ON or OFF position, until it is commanded to go to the other state. e.g. If ON it stays ON until it receives an OFF signal, and ignores any further ON signals. Each relay can control up to 20 amps and up to 277 volts. They are U.L. approved and have been in use for over 20 years.

Since all power for lights and other electrical items must be connected back to the breaker panel, the most convenient location for the relay cabinet is next to the breaker panel. Since the relays have 4 screws - 2 for line & 2 for load side each, they are convenient for terminating several lights to each breaker. Only 1 wire is needed from the breaker to 1 of the relays on that breaker. You can then run from relay to relay to feed power.

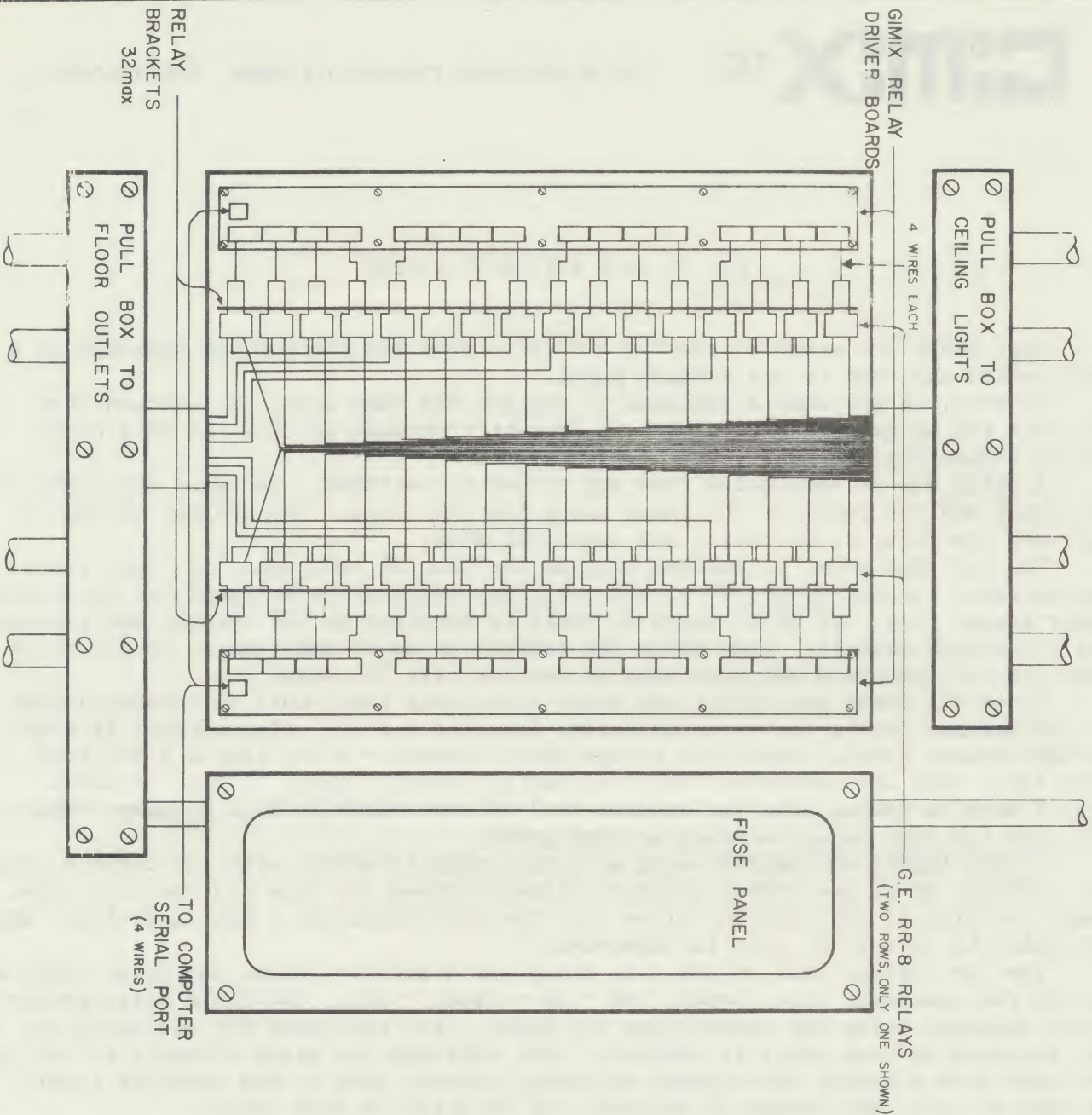
To dim lights we suggest using an extra relay in series with the light's relay. Put a diode, or if you prefer a rotary dimmer, across the line and the load side. When the relay is off, current flows thru the diode creating a dim condition. When the relay is on current path is unimpeded.

The low voltage side of the G.E. Relay has 4 wires - yellow for pilot light which we use for scanning, blue common, red - on - black - off. The GIMIX Relay Driver Board terminal strip has connections for these, plus provision for wiring ON and OFF switches to each relay if desired. When switches are wired directly to the board, you then have a normal low voltage switching system, even if the computer itself is down or out. Any number of switches can be wired to each relay.

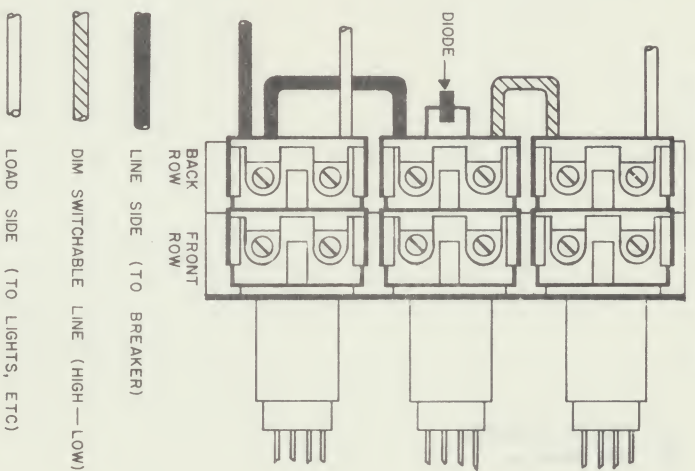
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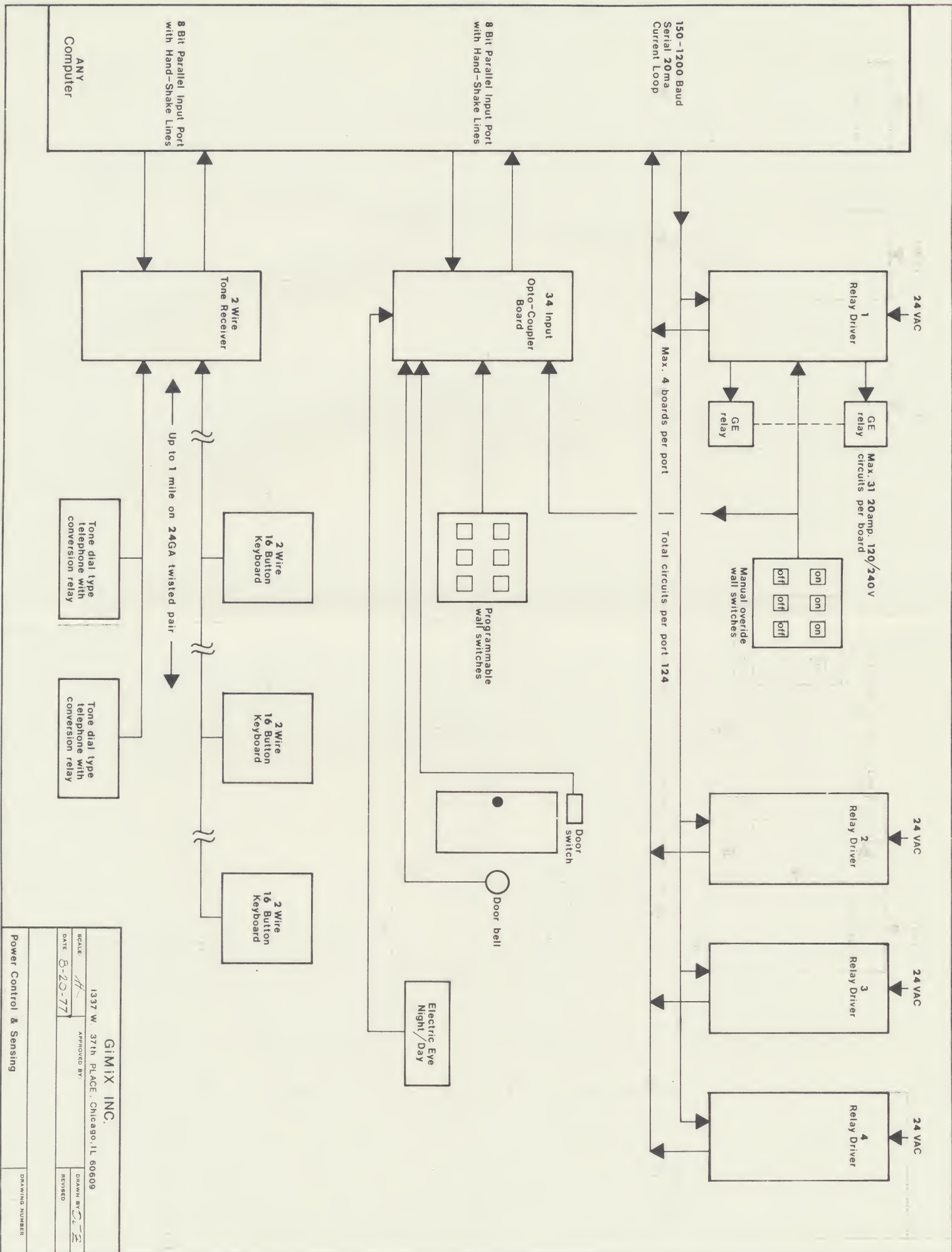


DETAIL OF G.E. RELAYS IN BRACKETS.
WIRING SHOWN ON BACK ROW.



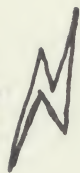
GIMIX INC.	
1337 W. 37th PLACE, CHICAGO, IL 60609.	
SCALE: <i>2x</i>	APPROVED BY: _____
DATE: 1-16-78	DRAWN BY: M.C. OHSIEG
RELAY DRIVER TYPICAL INSTALLATION	
AP. NOTES - 02	DRAWING NUMBER A 24 0021

Mar 78





GHOST



POWER



Mar 78

ARE YOU SELLING TO YOUR FULL MARKET POTENTIAL?

There are many buildings already using GE low voltage Relays like factories, office buildings, labs, etc. Think what computer control can do for them. Our RELAY DRIVER board interfaces the 20 amp GE Relays with a computer. Or stop to think of the GHOSTLY number of other switching applications you can do with a computer. Do you ever stop to think of the number of time controlled switches installed in office, apartment and industrial buildings that a single micro-computer could replace?

What about having a computer sense alarm conditions? Or being able to signal multiple computer functions from a single switch? The GHOST OPTO board is the answer.

Did you ever stop to think how expensive phone service and installation would be without central switching and dial phones? Our TONE RECEIVER board and 16 BUTTON KEYBOARD system allows a computer to be commanded from multiple locations using the same concept.

The RELAY DRIVER board connects to a serial port. The OPTO and TONE RECEIVER boards connect to 8 bit parallel ports. They can be used with any computer that has these types of ports.

Our other boards are compatible with the SWTP and other SS50 bus computers.

Can you sell VIDEO systems to places such as hotels, hospitals, schools, and apartment buildings that already have a master antenna system for regular TV; or stores for flashing merchandise specials; or waiting room message centers? Our VIDEO board has full interlace EIA output so the quality picture received is the same as that broadcast by TV stations. The GHOST concept is that you can see the display at multiple locations. Your prospects can use their regular TVs on their master antenna system for messages, news, advertising or whatever programs you can computerize. So look for buildings with master antenna systems - and SELL.

And then we have our 4K PPD PROM board which also burns 2708s. With its convenient off switch you can insert and remove 2708s without turning off the computer. And don't forget our 4 PORT SERIAL and 8 PORT PARALLEL I.O. interface boards. Plus our 16K PROGRAMMABLE STATIC RAM board that's the key to multi-tasking and software write protect. And soon to come -- our CPU and MAINFRAME followed by our DMA FLOPPY CONTROLLER.

SO WHAT IS A GHOST SYSTEM?

- | | |
|--|-------------------------------------|
| Q. How many 20 amp Relays will it drive? | A. Any number |
| Q. How many switches can be used? | A. Any number |
| Q. How many control locations? | A. Any number |
| Q. How many Video readouts? | A. Any number |
| Q. What else can it do? | A. Anything a microcomputer can do. |

The GHOST is a system. A system that can be tailored to each users particular needs. And there are lots of users out there who don't know it's available. Don't forget to also call on architects, engineers, and contractors. First tell them, then SELL them.

We are Dealer oriented.

How about you becoming GHOST oriented?

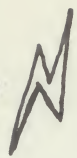
GIMIX inc.

1337 W. 37th Place Chicago, Ill. 60609
(312) 927-5510

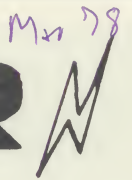
GIMIX and GHOST are Trademarks of GIMIX INC.



GHOST



POWER



Boards For All Computers

RELAY DRIVER BOARD for A. C. Power Control

This board can operate up to 31 20 amp circuits using G. E. RR 8 relays. Your computer talks to the relay driver board over a standard 20 mA current loop serial interface. Your computer serial interface can control up to 4 relay driver boards each. The board also has circuitry to scan each relay circuit and return its status to your computer for automatic detection of relay failures or manual overrides. With this board your computer can control lights, motors, appliances, machinery, etc. This board is 24"x5" and can be installed in an electrical cabinet.

THE OPTO ISOLATED INPUT BOARD

Interfaces your computer with up to 34 normally open switches. Each input is opto isolated and current limited. The board detects a momentary closure of any switch and passes the switch number to your computer through a parallel I.O. port with handshake lines. The board has a FIFO buffer memory which can store 64 switch numbers, is self scanning, and has complete debouncing circuitry. Any input voltage from 4 to 24 VDC can be used. With this board your computer can monitor wall switches, model railroads, alarms, automatic machinery, and many other applications.

16 BUTTON REMOTE 2 WIRE KEYBOARD SYSTEM

Ideal for multi-point remote control. Has 16 push buttons; 0 through 9, *, # and A,B,C,D. Any number of keyboards can be connected on 1 pair of wires to the Tone Receiver Board. Lockout feature - while one keyboard is being used others are locked out. Imagine, - only 1 pair of wires need be connected to your computer from these keyboards. They can be located anywhere on the premises up to 1 mile away on 24 gauge twisted wire.

TONE RECEIVER BOARD for controlling the above keyboards.

Converts our keyboard signals into binary. Only one per system required. Connects to any 8 bit parallel input port with handshake lines.

and our other SWTP SS 50 bus GHOST BOARDS



16K PROGRAM CONTROLLABLE STATIC RAM BOARD

4 PORT SERIAL I.O. BOARD

8 PORT PARALLEL I.O. BOARD

VIDEO BOARD

EXTENDER BOARD

8K PROM BOARD



And our unique 4K PROM BOARD which also programs up to four 2708's - with a convenient switch that allows you to remove or insert 2708's without turning off the computer.

All the above boards are in stock. All boards are assembled and tested.



and our complete universally flexible 6800 GHOST System



Our CPU Board includes a crystal controlled 6800 CPU, a separate crystal controlled baud rate generator for 110-9600 baud, 6840 programmable timer, 6810 RAM (128 bytes), four sockets for 2708 PROMS. All addressing is DIP switch selectable, (including E000/FC00 dual access for MIKBUG®). Fully buffered address and data bus. DMA capability through cycle-stealing or halt.

The MOTHER BOARD features fifteen 50 pin slots plus eight fully decoded DIP switch addressable 30 pin I.O. slots which can be configured to 4 or 8 decoded addresses.

The MAIN FRAME is 21"x19"x8", can hold 2 mini floppys, and has a power supply rated at 20 amps@ 8V, 5 amps@ +15V, and 5 amps @ -15V.

For more information - see your GHOST Dealer, or contact GIMIX, Inc.

GIMIX inc.

1337 W. 37th Place Chicago, Ill. 60609



(312) 927-5510

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1337 W. 37th PLACE, CHICAGO, ILL. 60609 (312) 927-5510

4K PPD BOARD

The GIMIX GHOST 4K PROM Programmer and Duplicator Board (4K PPD) permits a microprocessor to program one to four 2708 PROM's in less than three minutes. Each PROM has its own write-protect switch.

FEATURES

- Switch-selected address range (any 4K boundary)
- Included: one 2708 containing GIMIX programming/duplicating software
- Included: 120:30V, 200 mA transformer
- Master switch (with warning light) removes power from PROM's and disables the address switches (in effect, the board becomes non-existent)
- Four write-protect switches, one for each PROM position
- All five switches conveniently located on top of board
- Plugs into SS50 mother board
- If not used for programming, may be used as an ordinary 4K ROM Board

CONNECTIONS

Plug into SS50 mother board. Connect transformer primary (black leads) to 120V ac. Connect secondary (yellow) to 2-pin connector; or else strap 2-pin connector as shown in the assembly drawing, and connect secondary to UD1 and UD2 of the mother board.

Set address switches (bits A12-15) to desired range X000-XFFF. Note that a HIGH bit corresponds to an OFF Switch.

Power is provided to all four PROM positions only when master switch S5 is ON (and the warning light LED is lit). Make sure that S5 is OFF before removing or inserting PROM's.

Switches S1 to 4 are ON to write-enable PROM positions 1 to 4; they are OFF for read-only operation.

OPERATION

Reading is as usual for any ROM (but S5 must be ON). For writing, S5 and one or more of S1 to 4 must be ON. When board is addressed with R/W being LOW, the following occurs. After a delay to stabilize the data bus, address and data are latched, then the processor is halted. After a delay sufficient for the halt to be accomplished, the programming pulse of .81 msec (min .69, max .94) is sent to ALL FOUR PROM positions. After another delay, the PROM positions are deselected and the processor restarted. Thus, it requires between .71 and .96 msec (.83 average) to write one word, once. Note that this time is independent of processor speed: the processor is halted to assure that writing is successfully completed before new data arrives. Note also that switches S1 to 4 must be OFF to protect the corresponding PROM positions from the programming pulse.

User software should conform to 2708 manufacturer's specifications. In general, the number of passes (through all 1024 words) will depend on a specified total time, and the pulse width (given above).

RELAY DRIVER BOARD -- APPLICATION EXAMPLE

A computer system is to control four light circuits, each under 2000W. All lights shall be turned on at 7am and turned off at 6 pm. Two of the circuits have their own manual switches, and a third switch controls the other two circuits. The system shall keep track of power usage at night; between 6 pm and 7 am the status of each circuit shall be checked and recorded, once every minute.

To implement this application example with a GIMIX Relay Driver Board and four GE RR8 relays, make power connections as shown in the diagram. Note that each circuit is controlled by one relay (this assumes that the load does not exceed the relay's rating). Note also that the switch overriding two relays must be rated for twice the current of a one-relay switch. A 24V transformer powers the board and relays.

The diagram also shows switches in banks U⁹-10 set for the following transmission characteristics: board number 0, 300 baud, even parity, one stop bit, status responses enabled for error-free transmission (no response after errors).

When the computer clock reaches 7 am, the following sequence of commands must be sent to the board:

```
00 0 11111 turn off scan mode
00 1 00001 turn on relay 1
00 1 00011 " " " 3
00 1 00101 " " " 5
00 1 00111 " " " 7
00 1 11111 " " scan mode
```

Note that a board response is expected after each command, e.g. the second command should be followed by 00 1 00001 being sent by the board (relay 1 is on). If the response is unexpected, e.g. 00 0 00001 (relay 1 is off) or 01 0 10000 (wrong board and relay responding), or if no response arrives after .05 sec, the system should assume a malfunction and take appropriate action (repeat the command, notify the operator, etc).

At 6 pm, the following commands will turn off all four relays; as before, a response should follow each command:

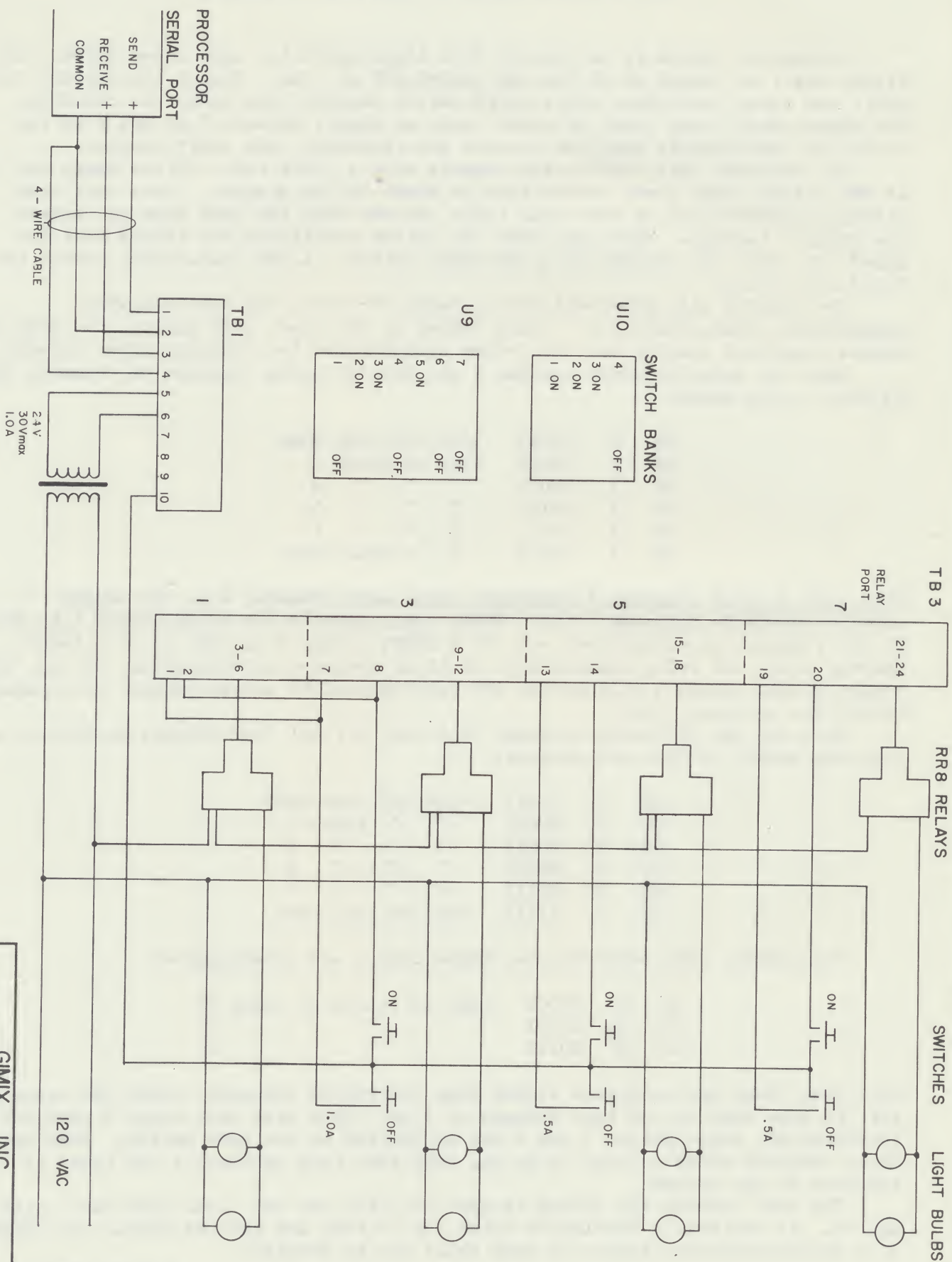
```
00 0 11111 turn off scan mode
00 0 00001 " " relay 1
00 0 00011 " " " 3
00 0 00101 " " " 5
00 0 00111 " " " 7
00 1 11111 turn on scan mode
```

Thereafter, once every minute, three relays are interrogated:

```
00 0 00001 what is status of relay 1?
00 0 00101 " 5
00 0 00111 " 7
```

Note that these are inquiries rather than activation commands, since the board was left in scan mode by the last command at 6 pm. Note also that relay 3 need not be interrogated, since relays 1 and 3 are controlled by the same switch. Whenever board response shows a relay to be on, this fact (and optionally the time) is recorded by the system.

The next morning the system is able to print out the total time each relay was on. If desired, a cumulative total can be kept and printed weekly or monthly; or a minute-by-minute status of each relay can be printed.



OPTO BOARD -- APPLICATION EXAMPLES

The GIMIX GHOST Opto Board, when attached to a computer system, offers the user the convenience of controlling many high-voltage circuits with only a few switches. In many cases existing low-voltage switches and wiring may be used.

ONE SWITCH -- TWO OR THREE CIRCUITS

Two circuits, e.g. a bathroom light and fan, are to be controlled by one switch. The switch is connected to an opto port in the range 0-31. Each time the switch is closed, the computer changes one of the circuits from on to off or vice versa, advancing through the sequence of four states: both off, light only on, fan only on, both on, both off....

One switch could also control three circuits, e.g. light, fan, and heater. Now the computer would go through eight possible states, so that the switch might have to be closed up to seven times before the desired state is reached. Since a momentary-contact switch may be pressed 4 or 5 times a second, the desired state can always be reached in no more than two seconds.

TIME-PROGRAMMED SWITCH

Two switches can control a security system. The night switch, connected to opto port 32 or 33, is closed at night by a timer or manually at other times. The entry switch is a photoelectric cell activated when a light beam is broken, and connected to an opto port in the range 0-31. Every time the entry switch goes from open to closed, the computer takes action depending on the state of the night switch.

For instance, if the night switch is open: turn on TV camera, TV screen, ring doorbell. If the night switch is closed: turn on TV camera, TV recorder, outdoor floodlights, call security guard.

TWO SWITCHES -- MANY CIRCUITS

Assume that eight high-voltage circuits are to be remotely controlled, and that they are normally required to be on or off in combination, some states being much more common than others. For instance, state 1 occurs 60% of the time; state 2, 20%; state 3, 10%:

circuit:	1	2	3	4	5	6	7	8
state 1:	off	ON	ON	off	off	off	off	ON
state 2:	ON	ON	ON	ON	off	off	off	off
state 3:	ON	off	off	off	ON	ON	off	off

During the remaining 10% of the time, the circuits may be in any of 253 other states.

Ordinarily, low-voltage control of eight circuits requires 16 switches and 17 wires. The use of a computer system with a GIMIX GHOST Opto Board reduces this requirement to only 2 switches and 3 wires. With suitable software, the computer will allow the user to turn on a programmed state in a fraction of a second; to turn on any state in a few seconds; and to designate, at any time, any state as a programmed state.

The switches are called A for Activate and S for Set. They may be SPST or momentary-contact type, connected to any two of opto ports 0-31 (see diagram). Switch A is normally used to turn on a programmed state; for instance, if state 2 shown above is designated as programmed state #2, it is turned on by the user's closing switch A twice in rapid succession (e.g. with no more than .5 sec between closings). Similarly, switch A may be closed three times in rapid succession to turn on state 3; or switch A may be closed once to turn on state 1 provided that at least .5 sec elapses before and after the closing.

To turn on a state other than those programmed, close switch S once. This tells the computer that, until further notice (i.e. until S is again closed once) each closing of A shall change the current state by switching exactly one circuit from on to off or vice versa. The change always starts with circuit #1 and proceeds in order.

For instance, let the circuit be in programmed state #3:

ON off off off ON ON off off
 which is to be changed to:
 off off off ON ON ON ON off

Since the initial state differs from that desired in three circuits (#1,4,7), the change requires three steps. In step one, choose one of the circuits to be changed, say #4 (underlined above). Apply a set sequence of the form S-A-A-...-A-S, i.e. close switch S once, then close switch A repeatedly until the circuit in question changes. In this case, starting with the initial state:

ON off off off ON ON off off

apply the set sequence S - A - A - A - A - S to produce the following circuit states:

<u>off</u>	off	off	off	ON	ON	off	off
<u>ON</u>	<u>ON</u>	off	off	ON	ON	off	off
ON	<u>off</u>	<u>ON</u>	off	ON	ON	off	off
ON	off	off	<u>ON</u>	ON	ON	off	off

Note that the last state is just like the initial state, except that the circuit #4 is on as desired. Note also that it is not necessary to know in advance that A was to be closed four times, since circuit #4 remained off until the last state reached.

In step two, use sequence S - A - S to turn off circuit #1:

off off off ON ON ON off off

In step three, change the remaining circuit:

ON	off	off	ON	ON	ON	off	off
<u>off</u>	<u>ON</u>	off	ON	ON	ON	off	off
off	off	<u>ON</u>	ON	ON	ON	off	off
off	off	off	<u>off</u>	ON	ON	off	off
off	off	off	ON	<u>off</u>	ON	off	off
off	off	off	ON	ON	<u>off</u>	off	off
off	off	off	ON	ON	ON	<u>ON</u>	off

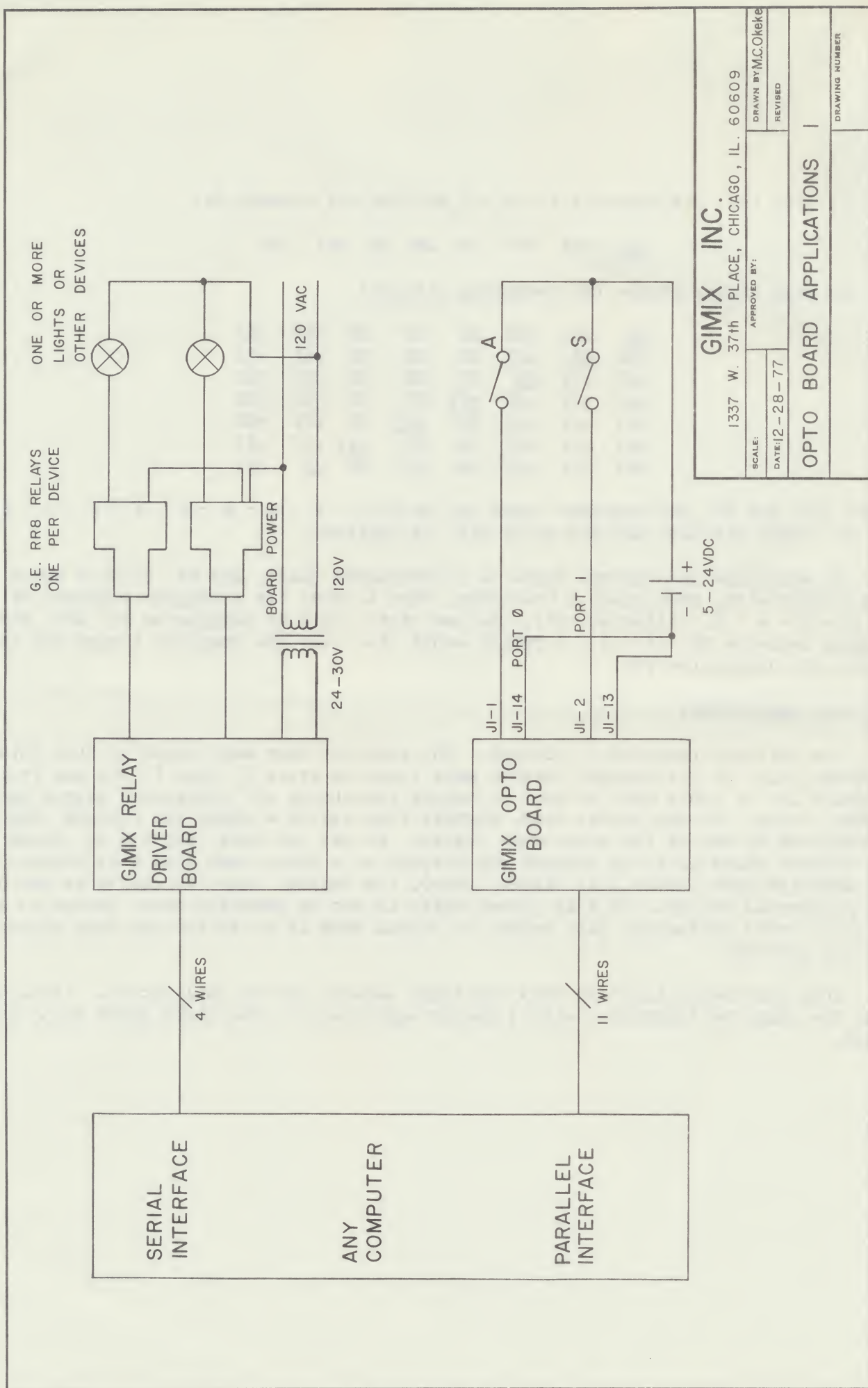
Since this was #7, the sequence turns out to be S - A - A - A - A - A - A - A - S, and all eight circuits are now on or off, as desired.

To designate the current state as a programmed state, say #4, close S twice in rapid succession, then close A four times, then S once, for a program sequence SS - A - A - A - A - S. Alternatively, the new state could be designated #2, with the program sequence SS - A - A - S (which would also make the computer forget the state previously designated #2).

SOFTWARE REQUIREMENT

The software required is minimal. The computer must keep track of time between closings, e.g. to distinguish between AA-A (turn on state 2, then 1) and AAA (turn on state 3). A table must be kept in memory containing all programmed states and the current state. In the normal mode, signals from switch A cause the current state to be replaced by one of the programmed states. In the set mode (after S is closed once), the current state is to be changed one circuit at a time, each time A is closed. In the memorize mode (after S is closed twice), the current state is stored as one of the programmed states. If S is closed while in set or memorize mode, return to normal mode; to avoid confusion, also return to normal mode if no switch has been closed for ten seconds.

This discussion included only the input aspects of the application. It is assumed that the computer interfaces with a device equivalent to the GIMIX GHOST Relay Driver Board.



GIMIX INC.

1337 W. 37th PLACE, CHICAGO, IL. 60609

SCALE:	APPROVED BY:	DRAWN BY: M.C. Okeke
DATE: 12-28-77	REVISED	
OPTO BOARD APPLICATIONS I		
		DRAWING NUMBER



GMXBUG SYSTEM MONITOR

The monitor will be produced in two compatible versions: One will operate a SWTP 6800 mainframe in Video Mode, while one will be the GIMIX "MONITOR OF THE FUTURE", to reside on the GIMIX CPU Board and support the GIMIX DOS. The monitor will be completely modular in construction, and will use table-driven external linkage to minimize address dependency, and permit easy modification of the monitor without the loss of compatibility to user programs.

The monitor will support keyboard input, Video output, and Audio Cassette as a Mass storage medium.

MINIMUM SYSTEM

The basic system which GMXBUG will support must include: MC 6800 CPU, Keyboard + Parallel Interface; Video Board; Audio Cassette + Serial Interface; 128 Bytes Scratch Ram; and User Ram (4K-56K Bytes). (NOTE: NO TERMINAL IS REQUIRED.)

COMPATIBILITY

GMXBUG will support the software that is available in the hobbyist market for the 6800. This means that the subroutine calls established in MIKBUG which are widely used by such software will be preserved in GMXBUG. The ones needed to support Uiterwyk 8K basic, which is the most important item to be supported are: RESET - \$E0D0

CONTRL - \$E0E3 - TRANSFER CONTROL TO MONITOR

INEEE - \$E1AC - GET A CHAR FROM THE KEYBOARD

OUTEEE - \$E1D1 - PRINT A CHAR ON THE TERMINAL

Most 6800 Hobbyist software will run with only these calls available.

FACILITIES

GMXBUG will provide the following facilities: Hexadecimal Debugging Package; Cassette Save and Load Routines; Numeric Base Conversion Routines; and Optional GIMIX DOS Interface.

GMXBUG does not have a "MAINLINE" separate from the Hex Debugging System. Control passes to the debugger at power-up. The debugger can call the other elements of GMXBUG.

The primary characteristic of GMXBUG is its unique linkage structure. All calls to GMXBUG by user programs will use the software interrupt instruction (SWI). The general form of a monitor call is 3F XX where XX is the code for the routine to be called.

Since no user program will ever jump to or call to an absolute address, GMXBUG compatibility with interpreters, the GHOST - APL system and other major software packages will be preserved even if GMXBUG is wholly rewritten. This is a very large advantage.

GIMIX works with all types of paging services — both selective level (where you dial only 7 digits), or end to end (where you dial in additional digits after the phone number).

GIMIX works with all types of Pocket Pagers.

GIMIX IS UNIQUE. The only device that links your Alarm or Answering Machine to your Pager in a failsafe manner that assures you your pages will get through.



GIMIX_{TM} AUTO-PAGE

manufactured and warranted by GIMIX Inc.
1337 W. 37th Place
Chicago, Ill. 60609
(312) 927-5510
TWX: 910-221-4055

Patent Pending

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**ENCYCLOPEDIA
CONDENSATION
OF
POCKET PAGING
FOR THE
LAY PERSON**

PAGERS OR BEEPERS

POCKET PAGER: compact device that goes Beep Beep when its personal signal is received.

- Dual address: gives either sporadic beep or solid tone depending on which number is called. Gives user 2 different signals in 1 Pager for nominal additional cost.
- Memory feature: If signal is received, Beep is stored until you switch on later.
- Vibrator feature: Pager vibrates instead of Beeping.

VOICE PAGER: Receives short voice message from caller or coded tones from Gimix that is heard by user.

RCC

Radio Common Carriers that have radio transmission towers to transmit the radio signals that activate the pagers.

PAGING COMPUTERS

answer the number that the caller or GIMIX dials, then codes in the user's distinctive radio signal and automatically sends it out over RCC equipment.

TWO BASIC TYPES: (many computers actually handle and intermix both types.)

1. **SELECTIVE LEVEL:** Each user has his own 7-digit phone number. Computer gives beep tone and sends signal out. No additional digits are needed. Requires separate phone number for each beeper.
2. **END TO END:** After computer answers with beep tone, additional digits must be dialed in. Can handle greater capacity of users at less cost.

GIMIX Auto-Page works with all the above. It can be triggered by an Answering Machine or Alarm System to automatically page the user.

GIMIX WORKS

WITH ALL ANSWERING MACHINES

- By virtue of GIMIX's line sensing circuit, no internal connections need be made to the answering machine, making the GIMIX truly universal.
- It determines if a message is left. You can preset its timer so the user is paged on every message or only on messages of a certain length. If a caller hangs up before the time set, no page is made.

WITH ALL TYPES OF ALARMS

- Burgler • Fire • Sprinkler • Boiler • Freezer
- And all types of Safety Shut Down applications.
Lets you put your Alarm signal in your pocket. Just wire the alarm to the GIMIX and the GIMIX to the phone line.

EASY TO HOOK UP

Program wires of phone numbers, then wire answering machine to GIMIX and GIMIX to phone line.

ELIMINATE HUMAN ERRORS

All this is done electronically using computer logic circuits:
After being triggered by an Answering machine message or an alarm condition, the GIMIX —
picks up the phone line —
detects dial tone —
dials out phone number of computer —
detects computer's answer —
then dials user's pager number (if needed).
If the call results in a non-answer or a busy signal, the GIMIX will hang up and start again until the sequence is completed.

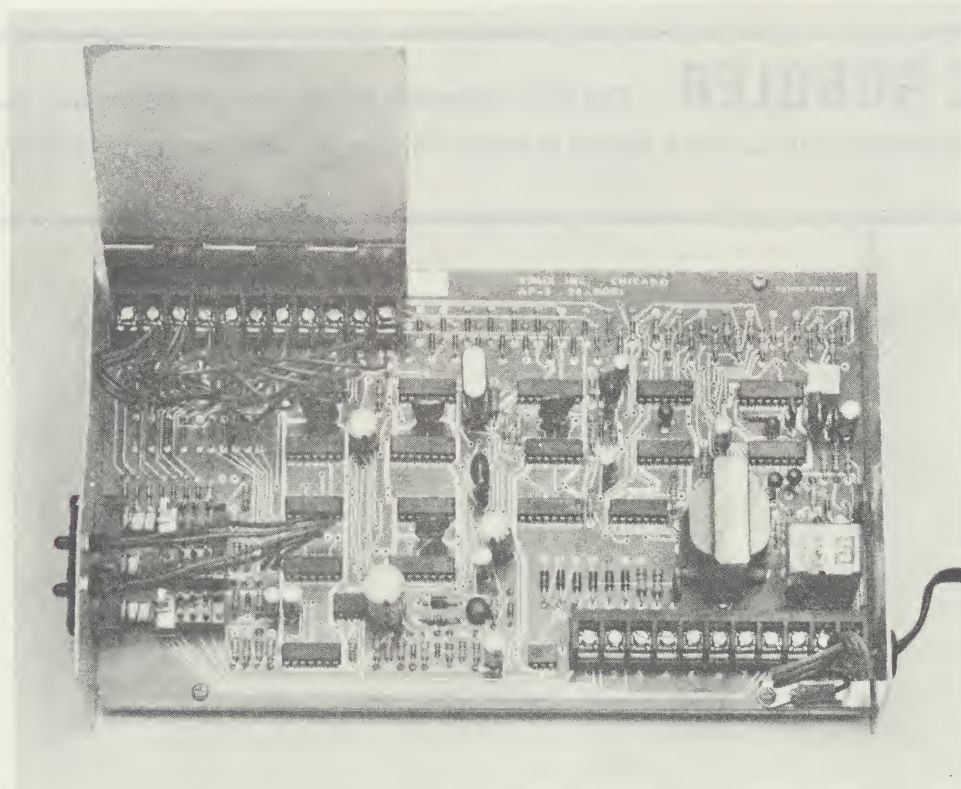
ALL SOLID STATE.
CAN PHONE OUT ON SAME LINE ANSWERING MACHINE IS ON,
OR DIFFERENT LINE.
CAN BE SET TO CALL YOUR PAGER ONCE OR TWICE.

The GIMIX AUTO-PAGE

- Notifies you promptly when a message is waiting on your answering machine or when an alarm condition has sounded.
- Unique message length timer — lets you choose whether you're paged on every message or only on certain messages. You choose the time — and only messages that long will page you.
- Easy, fast installation. No internal connections to your answering machine.
- Works with all type paging systems and all type pagers.
- Works best with ANY remote vox answering machine.
- Works with alarms. No answering machine is needed. Use with fire, burglar, freezer, elevator, boiler or any other type of alarm or safety shutdown application.
- It's intelligent — computer logic and fail-safe programming assures your page must get through. If the call results in a non-answer or a busy signal the GIMIX Auto-Page keeps redialing until the paging computer responds.
- No wasted phone calls. Once the page has been acknowledged by the paging computer, the Auto-Page hangs up.
- Can be used for manual signaling also. Convenient for the busy secretary or nurse.
- Models available for tone or pulse phone lines, and for up to 11 digit phone numbers.
- Certified under the F. C. C. Registration program.

Car Phones can work when you're in the car, diverters when you're at another phone, but the GIMIX System works everywhere in your paging area — 168 hours a week.

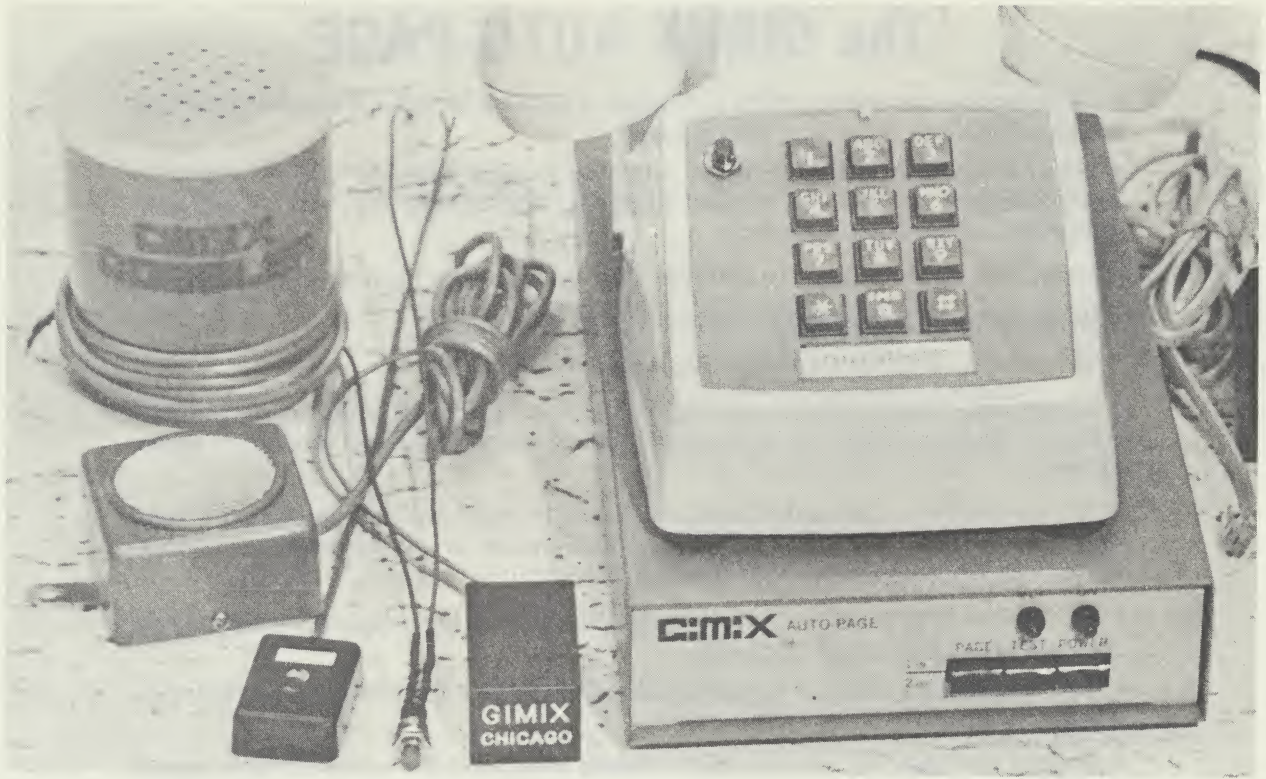
HERE'S THE GUTS



INVENTED & MANUFACTURED BY

GIMIX

INC. 1337 W. 37th Place Chicago, Ill. 60609
(312) 927-5510



HOLD GIMIX

With the HOLD GIMIX system, you use only 1 module that goes across tip & ring anywhere on the line. Any number of extensions can be used. You need a switch across tip & ring at each phone where you want to create a hold condition. To use, press button while hanging up. Hold releases automatically when any extension is picked up.

- Music on Hold—if you want—only 1 music source needed per line.
- The mini buttons can be installed quickly & easily into existing or new phones.
- Every phone can have a switch—but the hold won't work until the module is put on the line.

The GIMIX GOBBLER

The tone ringer that sounds like a turkey in love. Available in cup or case. Use with or instead of any bell, buzzer or chime. Simple to install. Wire to phone line or to any 12 to 24 volt AC or DC Source.

4K PPD BOARD

The GIMIX GHOST 4K PROM Programmer and Duplicator Board (4K PPD) permits a microprocessor to program one to four 2708 PROM's in less than three minutes. Each PROM has its own write-protect switch.

FEATURES

- Switch-selected address range (any 4K boundary)
- Included: one 2708 containing GIMIX programming/duplicating software
- Included: 120:30V, 200 mA transformer
- Master switch (with warning light) removes power from PROM's and disables the address switches (in effect, the board becomes non-existent)
- Four write-protect switches, one for each PROM position
- All five switches conveniently located on top of board
- Plugs into SS50 mother board
- If not used for programming, may be used as an ordinary 4K ROM Board

CONNECTIONS

Plug into SS50 mother board. Connect transformer primary (black leads) to 120V ac. Connect secondary (yellow) to 2-pin connector; or else strap 2-pin connector as shown in the assembly drawing, and connect secondary to UD1 and UD2 of the mother board.

Set address switches (bits A12-15) to desired range X000-XFFF. Note that a HIGH bit corresponds to an OFF Switch.

Power is provided to all four PROM positions only when master switch S5 is ON (and the warning light LED is lit). Make sure that S5 is OFF before removing or inserting PROM's.

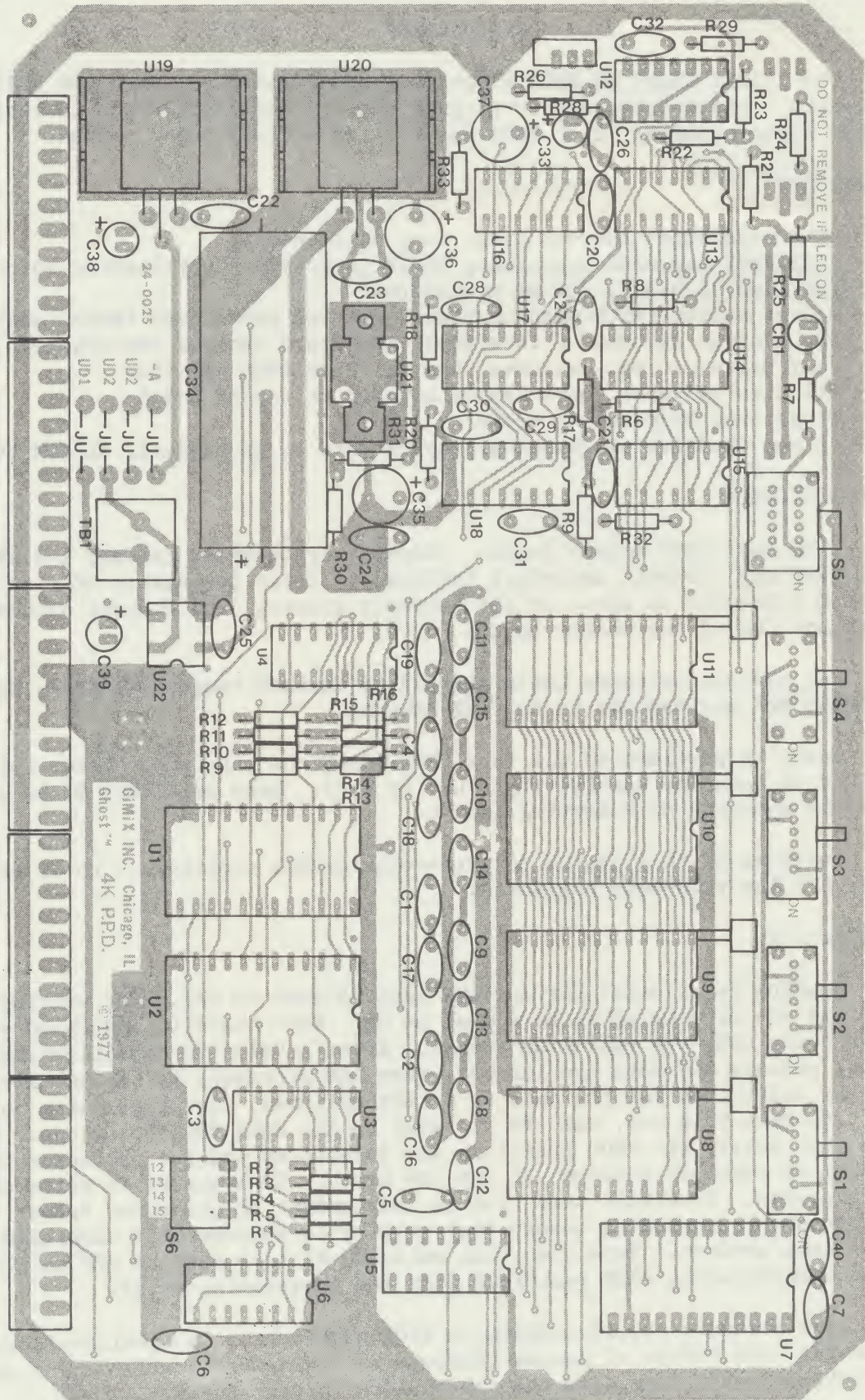
Switches S1 to 4 are ON to write-enable PROM positions 1 to 4; they are OFF for read-only operation.

OPERATION

Reading is as usual for any ROM (but S5 must be ON). For writing, S5 and one or more of S1 to 4 must be ON. When board is addressed with R/W being LOW, the following occurs. After a delay to stabilize the data bus, address and data are latched, then the processor is halted. After a delay sufficient for the halt to be accomplished, the programming pulse of .81 msec (min .69, max .94) is sent to ALL FOUR PROM positions. After another delay, the PROM positions are deselected and the processor restarted. Thus, it requires between .71 and .96 msec (.83 average) to write one word, once. Note that this time is independent of processor speed: the processor is halted to assure that writing is successfully completed before new data arrives. Note also that switches S1 to 4 must be OFF to protect the corresponding PROM positions from the programming pulse.

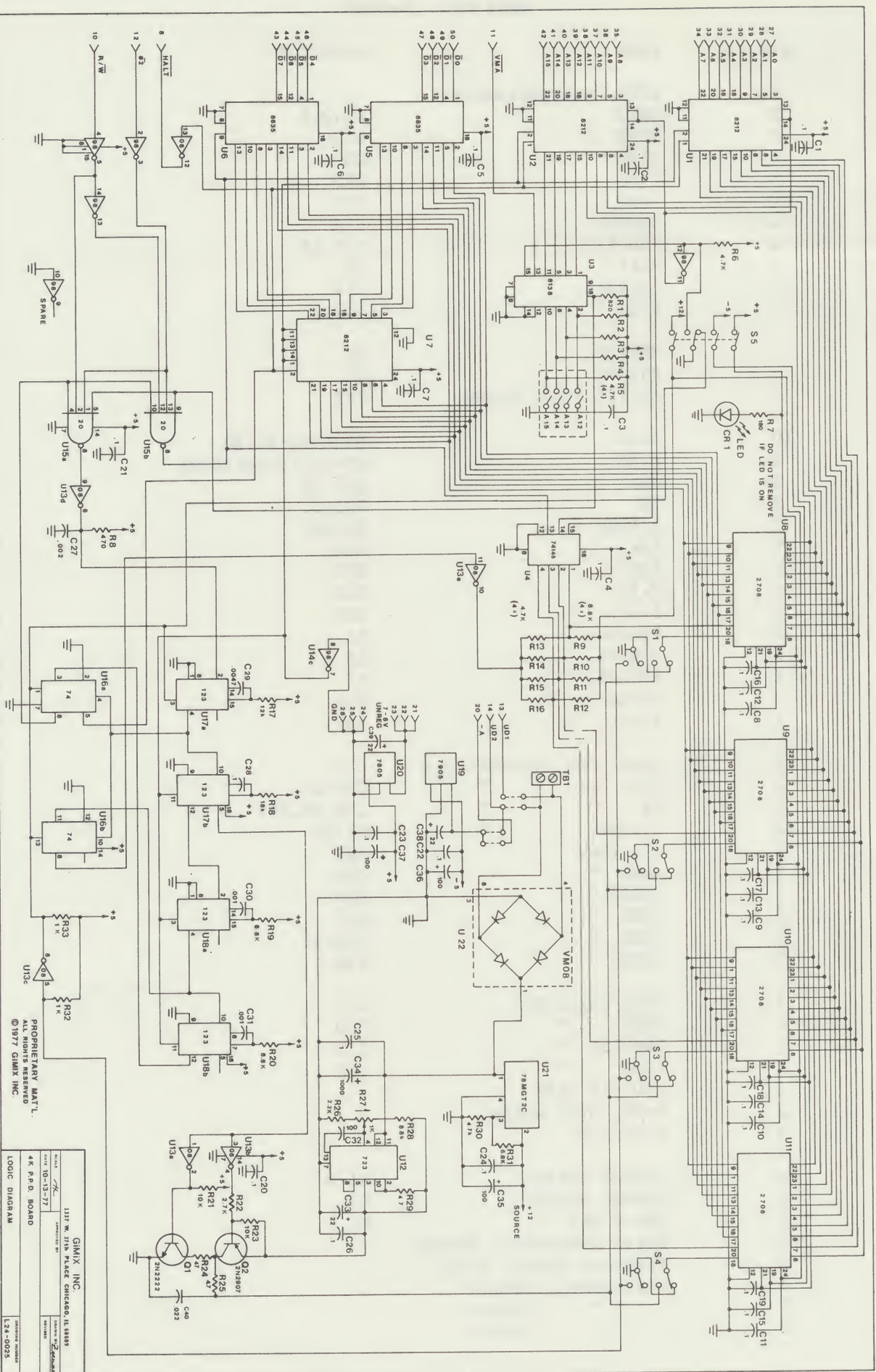
User software should conform to 2708 manufacturer's specifications. In general, the number of passes (through all 1024 words) will depend on a specified total time, and the pulse width (given above).

D01



GIMIX GHOST - 4K PPD
PART NO. 24-0025

QTY	PART	LOCATION
1	2708, preprogrammed	
3	8812	U1,2,7
2	8835	U5,6
1	8136	U3
1	7406	U13
1	7420	U15
1	74LS74	U16
2	74LS123	U17,18
1	74145	U4
1	74LS368	U14
1	1723	U12
1	2N2222	Q1
1	2N2907	Q2
1	FLV117 light diode	CR1
10	4.7k	R2-6,13-16,30
8	6.8k	R9-12,19,20,28,31
2	10k	R21,23
2	1k	R32,33
2	4.7ohm	R25,29
1	18k	R18
1	12k	R17
1	2.7k	R22
1	2.2k	R26
1	820ohm	R1
1	470ohm	R8
1	180ohm	R7
1	47ohm	R24
1	1kpot	R27
1	1000, 50v, electrolyte	C34
3	100, 16v "	C35-37
3	22 " "	C33,38,39
26	.1, 50v "	C1-26
1	.1, 100v	C28
1	.022 "	C40
1	.0047 "	C29
1	.002 "	C27
2	.001 "	C30,31
1	.0001 "	C32
1	7905 regulator	U19
1	7805 "	U20
1	78MGT2C "	U21
1	7632 "	U22
2	6107-14 sink	
2	4-40, 5/16 screw	
2	4-40 nut	
4	2250RG switch	S1-4
1	4200RG switch	S5
1	206-4 DIP "	S6
5	Molex connector, 10-pin	
1	Terminal block, 2-pin	
7	DIP socket, 24-pin	
7	" 16-pin	
4	" 14-pin	



2 - WIRE KEYBOARD

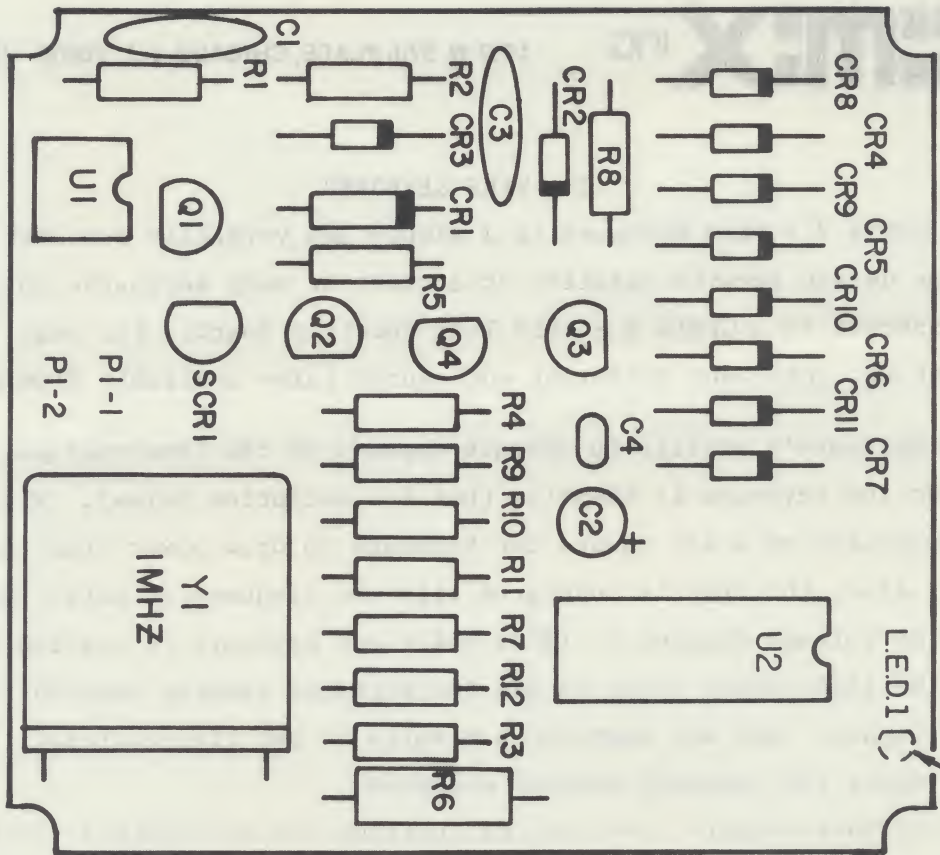
The GIMIX 2 - Wire Keyboard is a simple and versatile computer input device. Its unique design permits parallel attachment of many keyboards to a single 2 - wire line, connected to a GIMIX 2 - Wire Tone Receiver Board. Its small size allows a convenient fit into many different enclosures (also available from GIMIX).

The keyboard's ability to operate depends on the line voltage. If it is less than 24Vdc the keyboard is disabled (but see exception below). With 24 volts on the line, depression of a key causes the keyboard to draw power from the line (13mA approx). Also, the line is modulated with two frequencies while the key is held down. If the line voltage changes to 12Vds while the keyboard is enabled (i. e. drawing power), the light diode turns on and the keyboard remains enabled; data input may continue (again, each key depression results in two frequencies). If the line voltage drops to zero, the keyboard becomes disabled.

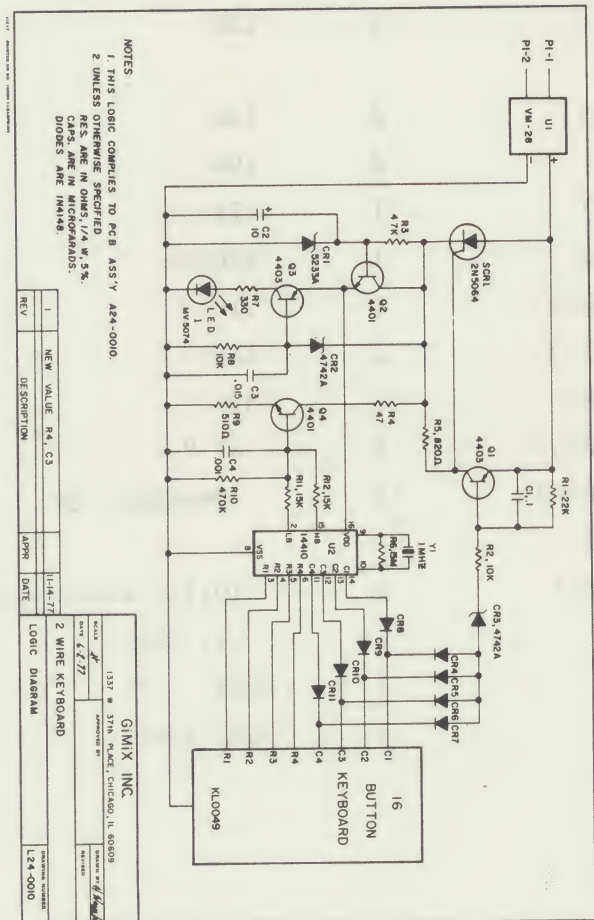
For further details, see the instructions for the GIMIX 2 - Wire Tone Receiver,

PARTS LIST

QTY	PART	LOCATION	QTY	PART	LOCATION
1	PC board, 24-0010-B		1	22k	R1
1	keyboard, 16-button		2	15k	R11,12
			2	10k	R2,8
1	VM28	U1	1	4.7k	R3
1	14410	U2	1	820ohm	R5
2	2N4401	U2,4	1	510 "	R9
2	2N4403	U1,3	1	470 "	R10
1	1N5233A	CR1	1	330 "	R7
2	1N4742A	CR2,3	1	47 "	R4
8	1N4004	CR4-11	1	15megohm, 1/2w	R6
1	1MHz crystal	Y1			
1	MV5074	LED1	1	10,16v electrolyte	C2
			1	.1, 50v	C1
1	DIP socket, 16-pin		1	.015 "	C3
1	cable, 2-wire		1	.001,100v	C4



MOUNT ON SOLDER SIDE



NOTES
1. THIS LOGIC COMPLETES TO PCB ASSY 124-0010.
2. UNLESS OTHERWISE SPECIFIED
CAPS. ARE IN OHMS, 1/4 W. 5%
DIODES ARE 1N4148.

REV	DESCRIPTION	DATE	APPRO	LOGIC DIAGRAM
1	NEW VALUE R4, C3	11-4-77		

GIMIX INC.
1337 W. 57th PLACE, CHICAGO, IL 60639

DATE 6-7-77
DRAWN BY J. J. J.

2 WIRE KEYBOARD

124-0010

2-WIRE TONE RECEIVER

The GIMIX 2-Wire Tone Receiver Board interfaces any computer system to an unlimited number of simple and compact input devices, all in parallel connection to a single pair of wires. When used with GIMIX 2-Wire Keyboards, the Receiver Board permits the computer to receive an attention signal from any keyboard; to return an acknowledgement to the signalling keyboard only; to lock out all keyboards except the one transmitting; and to interrupt transmission, if directed by software.

A version of the Receiver Board supports both keyboards and private telephones equipped with GIMIX Phone Conversion Relay (PCR) units. A PCR-equipped telephone may be used for data input either with the telephone on-hook or during a conversation. For further details, consult the user instructions for the GIMIX PCR.

FEATURES

- Any number of keyboards on one two-wire line, in parallel
- Tested on one mile of AWG-24 twisted pair
- Positive acknowledgement to the user: you have the line, keep sending OR the line is busy, try again after a few seconds
- Adjustable inter-digit delay: 2 to 10 seconds
- May be plugged into SS50 mother board for power supply
- Requires one half of a PIA, or other equivalent
- Requires 8-9 Vdc unregulated, +12 and -12 Vdc filtered; also -24 Vdc filtered if used with telephones
- Two versions: for keyboards only, or for keyboards and telephones

OPERATIONS

With 24 volts on the line, any keyboard may signal for attention by modulating the line with two frequencies. Within approx. 70 msec the receiver board responds by dropping line voltage to 12V. This turns on the acknowledgement light on the signalling keyboard, and locks out all others. The keyboard may now send more signals. The receiver board decodes each signal, placing a binary equivalent on DATA Lines (PIA D0-3), and a HIGH on DATA AVAILABLE (PIA CA1). Transmission will continue until terminated by timeout or upon computer request.

The end of any signal (i.e. when a key is released) starts a timer circuit on the receiver board. When timeout occurs, the board drops line voltage to zero for approx. 200 msec, thus disabling the transmitting keyboard. At the same time TIMEOUT (PIA D4) goes HIGH, and DATA AVAILABLE (PIA CA1) is strobed HIGH for 40 msec. Then line voltage is raised to 24V, and any keyboard may again signal for attention.

If the computer wants to terminate a transmission (E.G. in case of any illegal character or too many characters), it may strobe LOW the RELEASE line (PIA CA2) for at least 250 nanosec. The board will terminate at once if there is no signal on the line (no key held down); otherwise, it waits for the signal to end. As before, termination consists of line voltage going to zero, then to 24V; TIMEOUT going HIGH; however, DATA AVAILABLE remains LOW.

USER PROCEDURE

Signal for attention by depressing any key on the keyboard. If the acknowledgement light stays off, the keyboard is locked out; try again after a few seconds (i.e. after current transmission is ended). If the light goes on, depress keys as desired; time between strokes must not exceed inter-digit delay (specified by adjustment on the receiver board). Terminate simply by doing nothing after entering the last character; the light will go out when timeout occurs. If the light goes out in the middle of the transmission, you have taken too long between strokes; or else computer software has decided to terminate (e.g. you have entered four characters while the program expects only three).

When using a telephone, follow the same procedures except that attention is signalled by depressing a key reserved for that purpose.

The following tables show the correspondence between keyboard buttons, two-frequency signals, and DATA lines D0-3.

button	D3	2	1	0	hex	f_L	$f_H =$	1209	1336	1477	1633
0	0	0	0	0	0	$f_L = 697\text{Hz}$		1	2	3	A
1	0	0	0	1	1						
2	0	0	1	0	2	772		4	5	6	B
3	0	0	1	1	3						
4	0	1	0	0	4	852		7	8	9	C
5	0	1	0	1	5						
6	0	1	1	0	6	941		*	0	#	D
7	0	1	1	1	7						
8	1	0	0	0	8						
9	1	0	0	1	9						
*	1	0	1	0	A						
#	1	0	1	1	B						
A	1	1	0	0	C						
B	1	1	0	1	D						
C	1	1	1	0	E						
D	1	1	1	1	F						

CONNECTIONS

Connect power through J3 as follows:

pins 24,25,26: ground

pins 21,22,23: 8-9 Vdc, unregulated

pin 13 (or 19): +12 Vdc, filtered to max 50 mV peak-to-peak

pin 14 (or 20): -12 Vdc, filtered to max 50 mV peak-to-peak

Strap as shown in the logic diagram.

Connect the 2-wire line leading to keyboards to pins 13 and 14 of J 2.

Connect J 1 to one section of a PIA as follows:

DATA: pin 1 to D0, peripheral data line

DATA: 2 D1 "

DATA: 3 D2 "

DATA: 4 D3 "

TIMEOUT: 5 D4 "

DATA

AVAILABLE: 9 CA1, control line 1 (if section A is used)

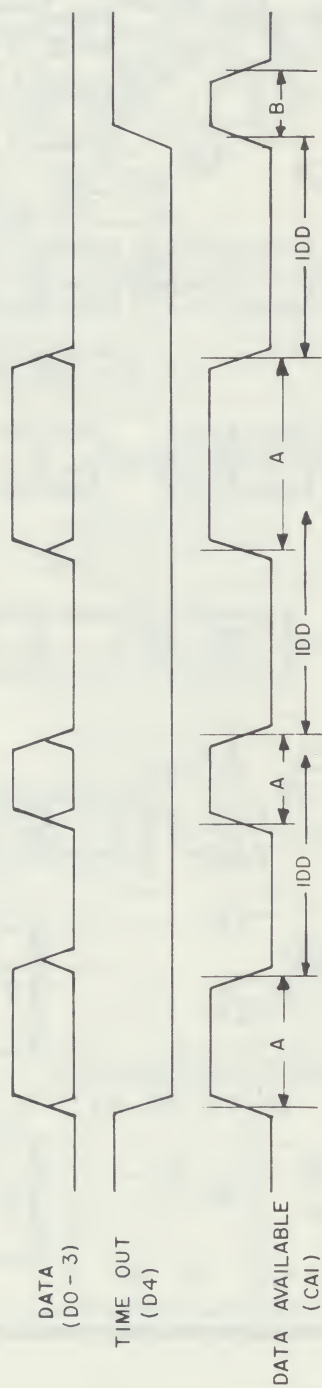
RELEASE: 10 CA2 " " 2 " " " "

6,7,8,11,12 are grounded(also assures grounding of D5,6,7)

13,14 no connection

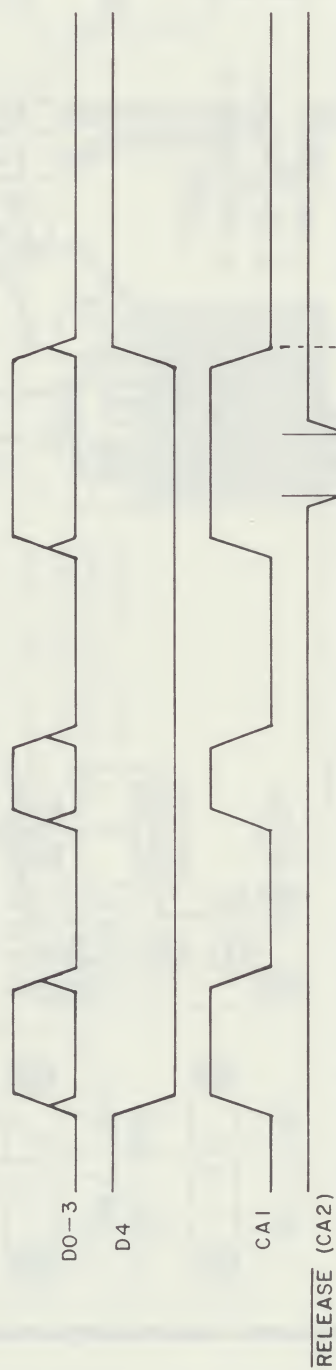
Adjust R27 for desired inter-digit delay (connect a keyboard, and observe how long the keyboard light stays on after a key has been depressed). DO NOT ADJUST R1-8 or R26.

Telephone connections: see user instructions for the GIMIX PCR.



TIMEOUT RELEASE OF KEYBOARD.

- A: HIGH AS LONG AS KEY IS DEPRESSED.
- B: TIMEOUT STROBE APPROX 40 MILLISEC MIN.
- IDD: INTER-DIGIT DELAY.
- DATA ON D0-3: CA1 HIGH, D4 LOW
- TIMEOUT OCCURED: CA1 HIGH, D4 HIGH, D0-3 LOW.



CPU RELEASE OF KEYBOARD.

- R: RELEASE STARTS AS SOON AS KEY IS LIFTED — D4 GOES HIGH, D0-3 LOW.



- PROPRIETARY MAT'L

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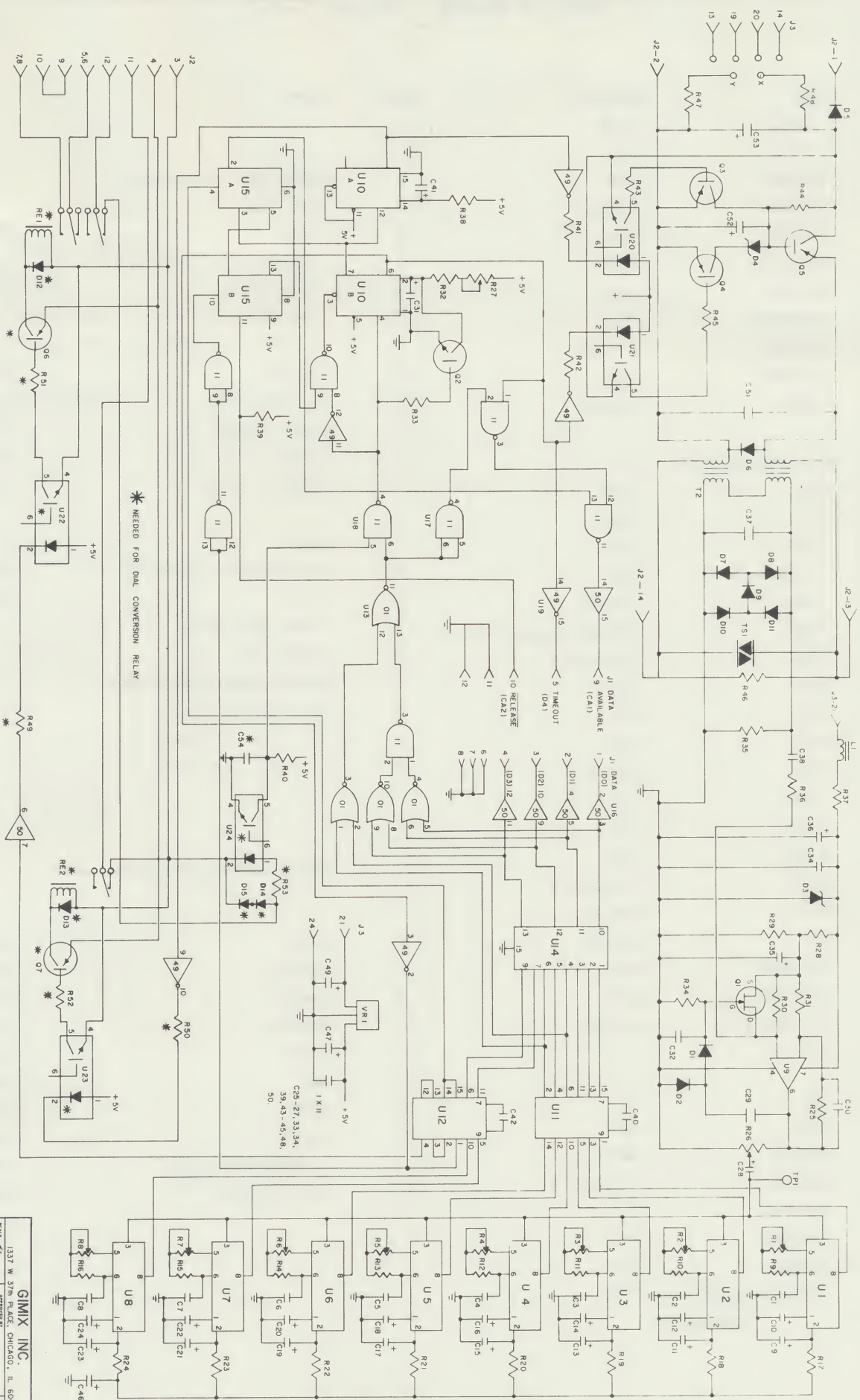
APPROVED BY:

SCALE: 	APPROVED BY:
DATE: 11-4-77	DRAWN BY: M.C. Okok
	REVISED

2-WIRE TONE RECEIVER

DRA WING NUMBER

A24-0017



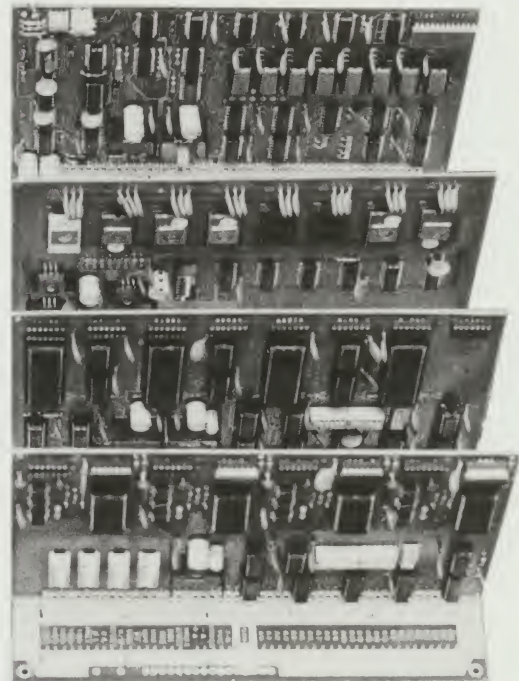
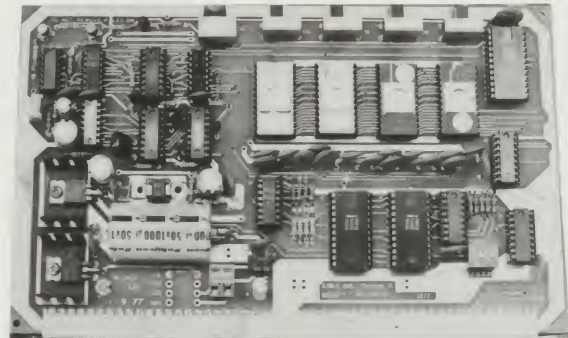
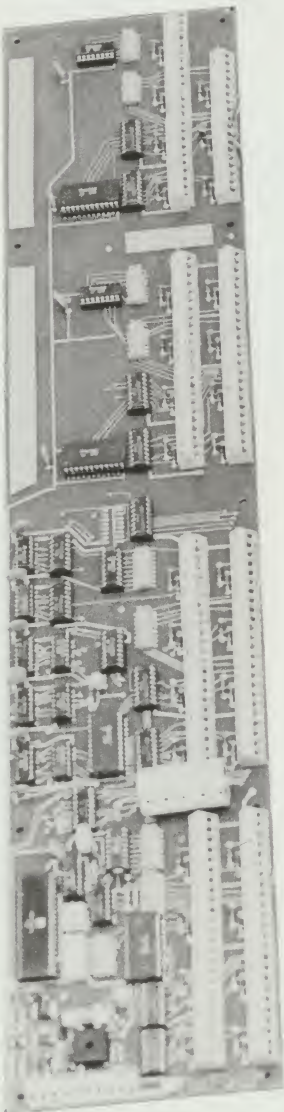
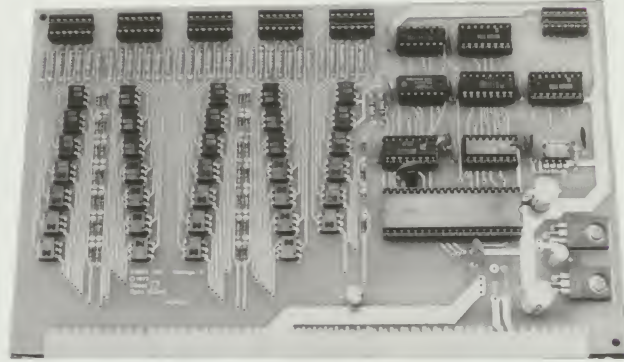
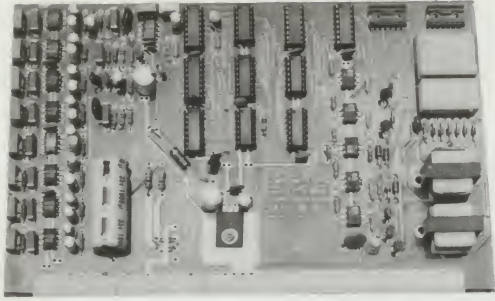
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GIMIX INC.	
1337 W 37th PL, CHICAGO, IL 60609	
Model <i>9700</i>	Approved by
Date 11-1-77	
2-WIRE RECEIVER	
DESIGN NUMBER	DESIGN SIGNATURE
L 24-0017	

QTY	PART	LOCATION	QTY	PART	LOCATION
8	567	U1-8			
1	741	U9			
1	MC14538	U10	1	1000, 50v, electrolyte	C53
2	MC14490	U11,12	1	220, 16v, "	C36
1	MC14001	U13	2	100, " "	C46,47
1	MC14419	U14	1	22, " "	C49
1	MC14013	U15	3	10, " "	C28,31,35
1	MC14050	U16	9	2.2,35v "	C10,12,14,16,18,20,22,24,41
2	MC14011	U17,18	9	1, 50v, electrolyte	C9,11,13,15,19,21,23,52,17
1	MC14049	U19	11	.1, 2%	C1-8,29,32,38
2	MCT2	U20,21	12	.1, 50v disc	C25-27,33,34,39,43-45,48,50,51
1	5k potentiometer	R1	1	.047, " mylar	C37
7	2k "	R2-8	2	.015 " "	C40,42
1	1k "	R26	1	.0001 " mica	C30
1	100k "	R27	1	22mH	L1
1	1 megohm	R34	2	transformer, 2x600 ohm	T1,2
2	470k	R35,46	1	7805	VR1
6	100k	R25,30,32,36,39,40	1	4-40, 5/16 screw	
3	56K	R33,43,45	1	4-40 nut	
1	27k	R38	5	molex connector, 10-pin	
1	12k	R9	6	DIP socket, 16-pin	
1	11k	R10	6	" 14-pin	
2	10k	R11,12	9	" 8-pin	
1	7.5k	R13			
1	6.8k	R14			
1	6.2k	R15			
10	4.7k	R16-24,44		Phone conversion option parts:	
2	1.2k	R41,42			
2	1k	R28,29	3	MCT2	U22-24
1	510 ohm	R31	2	2N4403	Q6-7
1	100 ohm	R37	2	1N4148	D12-13
2	47 ohm $\frac{1}{2}$ w	R47,48	2	1N4002	D14-15
			2	1.2k	R49-50
			2	56k	R51-52
1	111	Q1	1	20ohm	R53
1	6514	Q2	1	.1,50v	C54
3	2N4403	Q3-5	1	1475-2C-24D relay	RE1
8	1N4148	D1,2,6-11	1	1475-1C-24D "	RE2
1	1N5232A	D3			
1	1N4742A	D4			
1	1N4002	D5			
1	33Z1U5GE transient suppressor	TS1			

Mar 78



GIMIX inc.

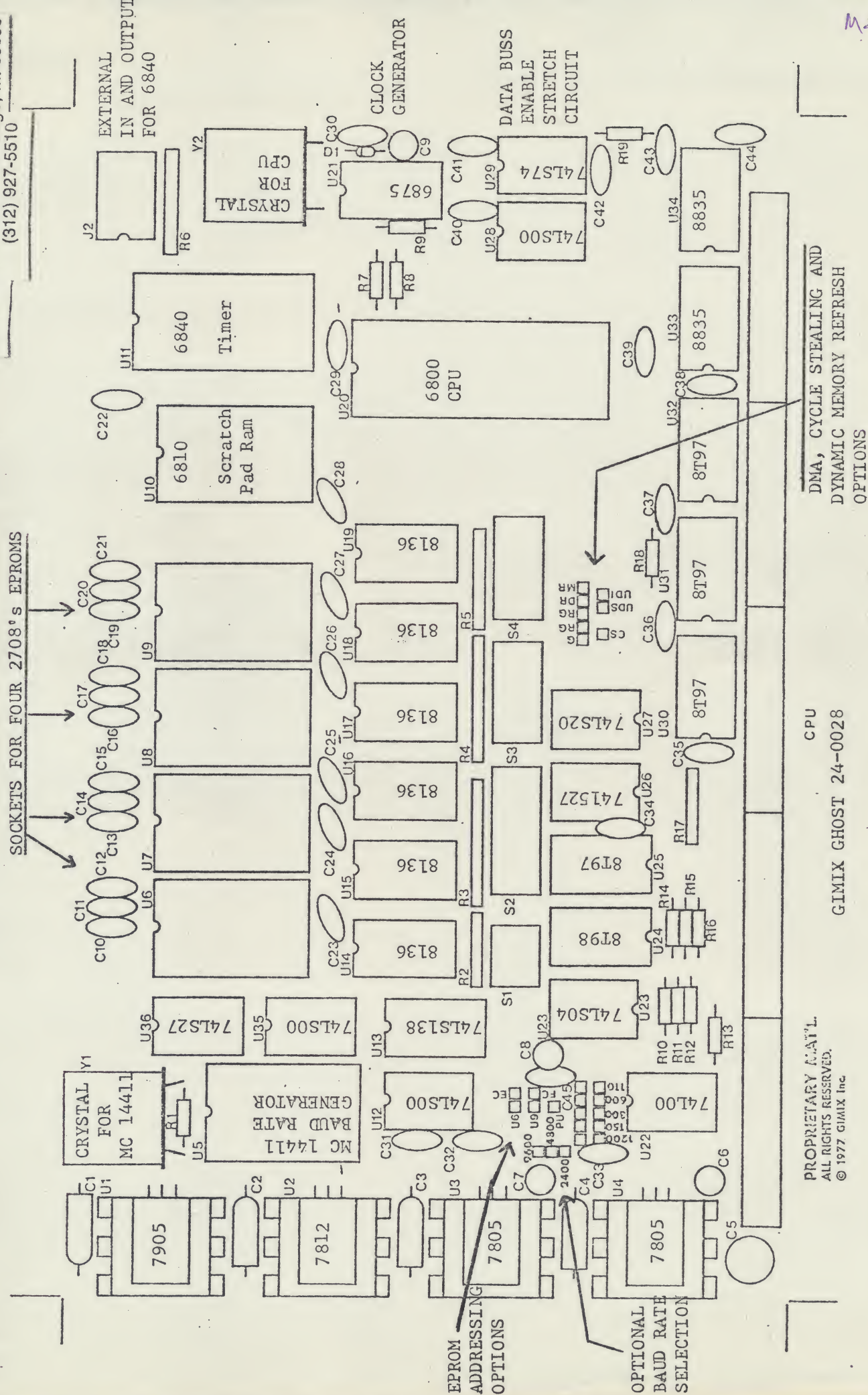
1337 W. 37th Place Chicago, Ill. 60609

(312) 927-5510





SS1 ADDRESS SWITCHES FOR EPROMS (any 4K boundary)
SS2 ADDRESS SWITCHES FOR 6810 (any 128 byte boundary)
SS3 + S4 ADDRESS SWITCHES AND INTERRUPT SELECTION FOR 6840 (any 8 byte boundary)



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GIMIX GHOST 24-0028 CPU

DMA, CYCLE STEALING AND DYNAMIC MEMORY REFRESH OPTIONS

Mar 78

Mar 78

Dear Dealer:

Our GMXBUG Monitor will be available shortly. It is designed for use with our Video Board and no terminal is required -- only a keyboard. It will be on 2 2708 PROMs with a manual. It is used in place of MIKBUG or SWTBUG.

Dealer costs are as follows:

2 chip set and Manual	\$ 48.00
Video Board & GMXBUG	\$217.00
8K PROM Board, Video Board & GMXBUG	\$294.00

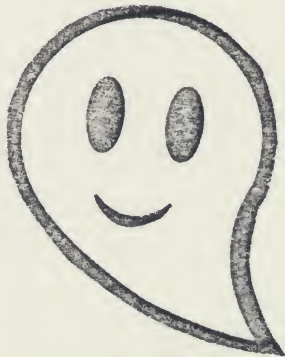
We are now taking orders on this.

We will have a room at the Holiday Inn across from the Convention Center at the West Coast Computer Faire. We will preview our complete GHOST system for you.

We believe our new cabinet, power supply, mother board and CPU make up the most powerful and flexible 6800 mainframe on the market.

Seeing is believing.

See us there.



HERE'S GOOD NUMBERS TO YOU

\$888.88

That's Dealer cost on this package.

This is an introductory price offer for this package only, and no 10% advertising credit can be allowed on this package.

Deliveries should start before May 1. The supply situation on 4044s may limit our capacity to ship, but we anticipate no problems on anything else.

Here is what you get.

- A CABINET with key operated power switch (OFF, ON, & ON plus RESET) and space for 2 mini floppys. Size 21" x 18" x 7".
- A MOTHER BOARD that has fifteen 50 pin slots plus eight fully decoded DIP switch addressable 30 pin I.O. slots which can be configured to 4 or 8 decoded addresses.
- A super POWER SUPPLY rated at 20 amps @ 8V, 5 amps @ +15 and 5 amps @ -15V.
- A COOLING FAN
- A CPU board that includes;
 - a crystal controlled 6800 CPU,
 - a separate crystal controlled baud rate generator for 110-9600 baud,
 - a 6810 RAM (128 bytes),
 - four sockets for 2708 PROMs.

All addressing is DIP switch selectable, (including E000/FC00 dual access for MIKBUG). Fully buffered address and data bus. DMA capability through cycle-stealing or halt.

(The three independent software programmable timers are available at \$48 more when ordered with the package.)

- A VIDEO BOARD
- Our 2K GMXBUG Video based monitor (installed on the CPU board).
- A 2 port Parallel I.O. board
- and-8K of STATIC RAM (TMS 4044s). This will be on our 16K programmable RAM board, but with only two 4K blocks and without the software programmable parts. Each 4K block has independent DIP switch selectable addressing. (The complete 16K software programmable RAM board is available at \$288 more when ordered with the package.) The user can add up to 8K additional RAM.

This is assembled. This is tested. This will be delivered as 1 package.

Only a keyboard and a Video monitor is needed to have a complete video based system.

You can price it out so you'll be offering a Cadillac at a Chevy price.

REMEMBER: This system can be configured to use SWTP or MSI softwares as well as GIMIX software because of the DIP switch selectable addressing features on our CPU and MOTHER boards.





GMXBUG SYSTEM MONITOR

The monitor will be produced in two compatible versions: One will operate a SWTP 6800 mainframe in Video Mode, while one will be the GIMIX "MONITOR OF THE FUTURE", to reside on the GIMIX CPU Board and support the GIMIX DOS. The monitor will be completely modular in construction, and will use table-driven external linkage to minimize address dependency, and permit easy modification of the monitor without the loss of compatibility to user programs.

The monitor will support keyboard input, Video output, and Audio Cassette as a Mass storage medium.

MINIMUM SYSTEM

The basic system which GMXBUG will support must include: MC 6800 CPU, Keyboard + Parallel Interface; Video Board; Audio Cassette + Serial Interface; 128 Bytes Scratch Ram; and User Ram (4K-56K Bytes). (NOTE: NO TERMINAL IS REQUIRED.)

COMPATIBILITY

GMXBUG will support the software that is available in the hobbyist market for the 6800. This means that the subroutine calls established in MIKBUG which are widely used by such software will be preserved in GMXBUG. The ones needed to support Uiterwyk 8K basic, which is the most important item to be supported are: RESET - \$E0D0

CONTRL - \$E0E3 - TRANSFER CONTROL TO MONITOR

INEEE - \$E1AC - GET A CHAR FROM THE KEYBOARD

OUTEEE - \$E1D1 - PRINT A CHAR ON THE TERMINAL

Most 6800 Hobbyist software will run with only these calls available.

FACILITIES

GMXBUG will provide the following facilities: Hexadecimal Debugging Package; Cassette Save and Load Routines; Numeric Base Conversion Routines; and Optional GIMIX DOS Interface.

GMXBUG does not have a "MAINLINE" separate from the Hex Debugging System. Control passes to the debugger at power-up. The debugger can call the other elements of GMXBUG.

The primary characteristic of GMXBUG is its unique linkage structure. All calls to GMXBUG by user programs will use the software interrupt instruction (SWI). The general form of a monitor call is 3F XX where XX is the code for the routine to be called.

Since no user program will ever jump to or call to an absolute address, GMXBUG compatibility with interpreters, the GHOST - APL system and other major software packages will be preserved even if GMXBUG is wholly rewritten. This is a very large advantage.

OPTO BOARD

The GIMIX GHOST Opto Board is a general-purpose interface between up to thirty-four switches and a microprocessor. It is designed for maximal flexibility and independence from external constraints (such as hardware, voltage, or data coding limitations). The Opto Board is suitable for a variety of applications: accepting input from a keyboard (which may include shift and control keys); monitoring of opening and closing of doors and windows; monitoring of burglar and fire alarm devices, clocks, timers, thermostat controls, fuses and lighting circuits. When used with an appropriate output interface such as the GIMIX GHOST Relay Driving Board, the Opto Board turns a microprocessor into a powerful and versatile stand alone control system.

FEATURE HIGHLIGHTS

- 34 switch ports, each with its own optocoupler for better protection from excessive switch voltages (1500V isolation).
- All switch ports are constantly scanned by the Opto Board (processor time not required), .9 ms maximum for a complete scan of all ports.
- Built-in debouncing provided (8 ms approx.).
- Built-in current-limiting resistors permit any switch voltage between 5 and 24V dc (or higher, if external resistors used).
- Built-in memory buffer saves up to 64 switch-closed signals, permitting the processor to complete lengthy tasks between interruptions.
- DATA READY line may be tied to an interrupt request line; thus the processor need read the Opto Board only when data is available.
- Built-in "buffer full" signal: this diagnostic aid alerts the system designer that his processor control program permits 64 switch activity inputs to accumulate unread by the processor.
- Buffered, TTL-compatible output lines.
- Built-in supply voltage regulators.
- Noise-immune board layout, achieved through separation of opto-coupler input and output foil lines.

FUNCTIONAL DESCRIPTION

The thirty-four ports fall into two groups: ports 0-31 are analogous to typewriter character keys, while ports 32 and 33 are analogous to shift keys. The Opto Board sends to the processor a port number, whenever a switch connected to that port (in the 0-31 range) goes from open to closed. This port number (5-bit binary) is accompanied by two bits describing the current state (open or closed) of switches connected to ports 32 and 33.

The encoder scans all ports in at most .9 ms. If current through an optocoupler is detected twice, approximately 8 ms apart (to allow for debouncing), the corresponding switch is considered to be closed. An unused post is sensed as an open switch.

If a switch in the 0-31 range goes from open to closed, a data word is generated. As mentioned above, the word consists of a 5-bit port number and two bits for the state of ports 32 and 33 (see Table 1). The word is sent to a 64 word FIFO memory buffer. If the buffer becomes full (i.e. the processor has not read the last 63 words) a "buffer full" signal is generated.

The processor is alerted to the presence of data in the buffer by a high level of the DATA READY line. Having read a word, the processor strobes the DATA ACCEPTED line whereupon the buffer discards the word just read and drops DATA READY (unless there are more unread words in the buffer). Data has the following format:

D0 to D4 = port number (0-31)
D5 high = switch 32 is closed
D6 high = switch 33 is closed
D7 high = buffer full

Note that D7, once it goes high, remains high until the encoder sends a new word to the buffer. The processor may clear D7 by strobing RESET (which would also empty the buffer without reading).

Once full, the buffer will accept no more words until a processor read. Loss of data may be prevented through use of proper software, e.g. sufficiently frequent enabling of interrupts. In some cases it may be necessary to tie D7 to an interrupt line (instead of the data bus).

PROCESSOR CONNECTIONS

The Opto Board connects to the processor through J6 and the 50-pin connector as follows:

Connector	Pin	Name	or	Function
J6	1	D0		Code for one of
"	2	D1		thirty-two
"	3	D2		ports
"	4	D3		(0-31)
"	5	D4		
"	6	D5		Port 32
"	7	D6		Port 33
"	8	D7		Buffer full
"	9	<u>Data Ready</u>		
"	10	<u>Data Accepted</u>		
"	13	Reset		
"	11, 12	Ground		
50-pin	21,22,23	7-9V dc, unregulated		
"	24,25,26	Ground		
"	20	-A: normally -12V dc		
"	14	UD2: user defined		

Lines D0-D7 are processor inputs and may be connected to the processor data bus or, in the case of 6800 equipped with a PIA, to input-conditioned peripheral lines, or to a PIA input control line. DATA ACCEPTED and RESET may be connected to putput-conditioned peripheral or control lines.

The 50-pin connector provides the power supply connection from the host processor. Note that pin 20 (-A) conforms to GIMIX mother board design; pin 14 (UD2) may be used if strapped by the user.

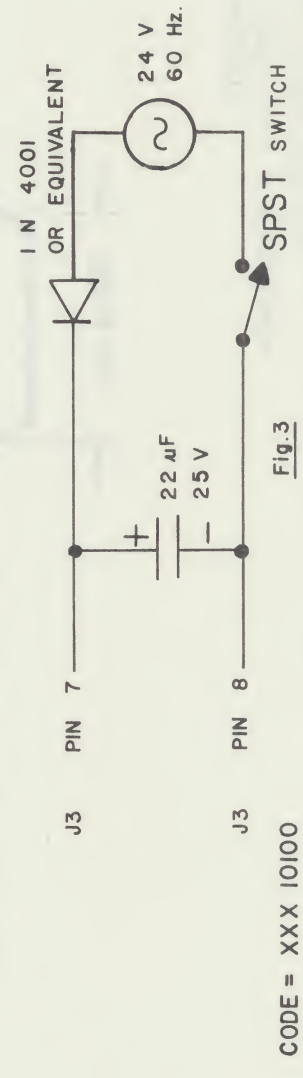
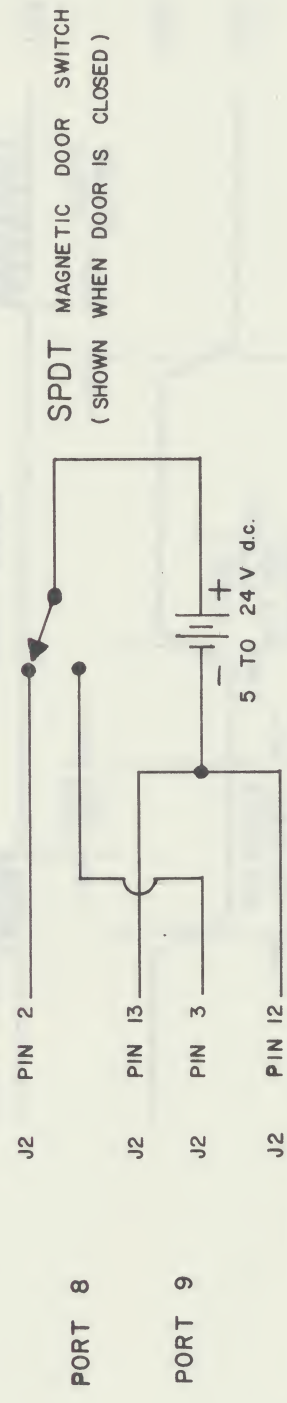
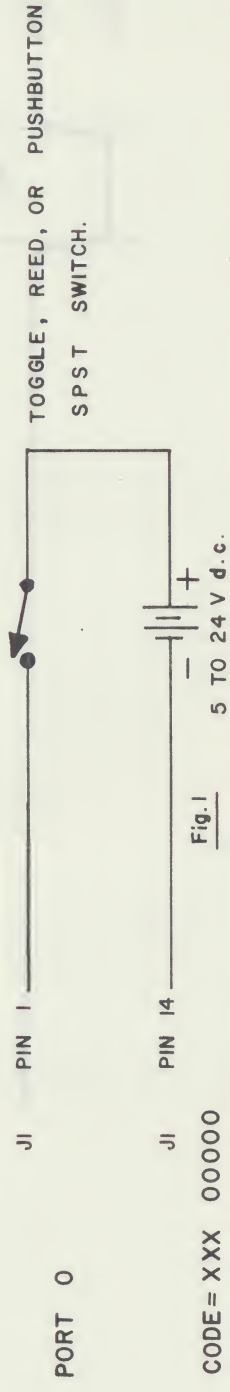
SWITCH CONNECTIONS

A variety of switches may be connected to the Opto Board; they need not be debounced, since the Opto Board provides its own built-in debouncing function. A voltage from 5 to 24 V dc is acceptable; voltage exceeding 24 V dc would require an external resistor. An ac source may also be used (see diagrams). The diagrams illustrate some possible switch connections. The 8-bit binary codes represent data appearing on D0 through D7. Note that the positive side of the voltage source must be connected to the pin shown.

TABLE 1

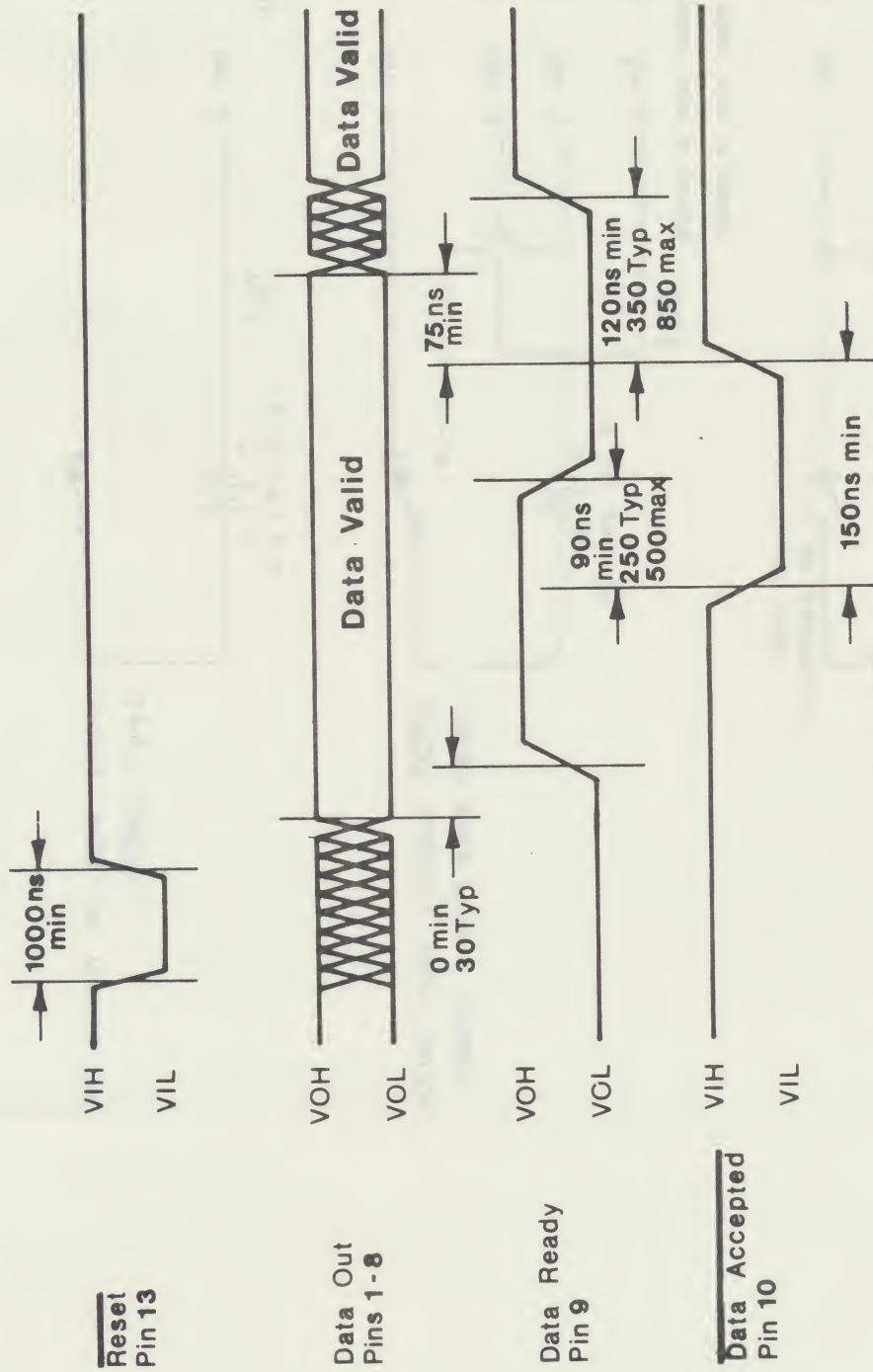
Port Number	Connenction	Pins *	Code on output lines:				
			D4	D3	D2	D1	D0
0	J1	1 14	0	0	0	0	0
1	"	2 13	0	0	0	0	1
2	"	3 12	0	0	0	1	0
3	"	4 11	0	0	0	1	1
4	"	5 10	0	0	1	0	0
5	"	6 9	0	0	1	0	1
6	"	7 8	0	0	1	1	0
7	J2	1 14	0	0	1	1	1
8	"	2 13	0	1	0	0	0
9	"	3 12	0	1	0	0	1
10	"	4 11	0	1	0	1	0
11	"	5 10	0	1	0	1	1
12	"	6 9	0	1	1	0	0
13	"	7 8	0	1	1	0	1
14	J3	1 14	0	1	1	1	0
15	"	2 13	0	1	1	1	1
16	"	3 12	1	0	0	0	0
17	"	4 11	1	0	0	0	1
18	"	5 10	1	0	0	1	0
19	"	6 9	1	0	0	1	1
20	"	7 8	1	0	1	0	0
21	J4	1 14	1	0	1	0	1
22	"	2 13	1	0	1	1	0
23	"	3 12	1	0	1	1	1
24	"	4 11	1	1	0	0	0
25	"	5 10	1	1	0	0	1
26	"	6 9	1	1	0	1	0
27	"	7 8	1	1	0	1	1
28	J5	1 14	1	1	1	0	0
29	"	2 13	1	1	1	0	1
30	"	3 12	1	1	1	1	0
31	"	4 11	1	1	1	1	1
32	"	5 10	(line D5)				
33	"	6 9	(line D6)				

* For each pair of pins, the one listed first must be positive,
e.g. 5 to 24 V dc on pin 1, ground pin 14.



GIMIX INC.		1337 W. 37th PLACE, CHICAGO, IL. 60609.	
SCALE: <i>HY</i>	APPROVED BY:	DRAWN BY: MCO	REVISED:
DATE: 9-7-77			
SWITCH CONNECTION EXAMPLES (Opto Board)			
DRAWING NUMBER		L 240023 A	

OPTO BOARD Data Output & Hand Shake Timing



Notes: All times are in nanoseconds.

RESET Min pulse width 1000 ns = 1 micro sec.

DATA ACCEPTED Min pulse width 150 ns.

DATA ACCEPTED must be high for **DATA READY** to return high.

DATA OUT will not change until **DATA ACCEPTED** goes low and then returns high (strokes low).

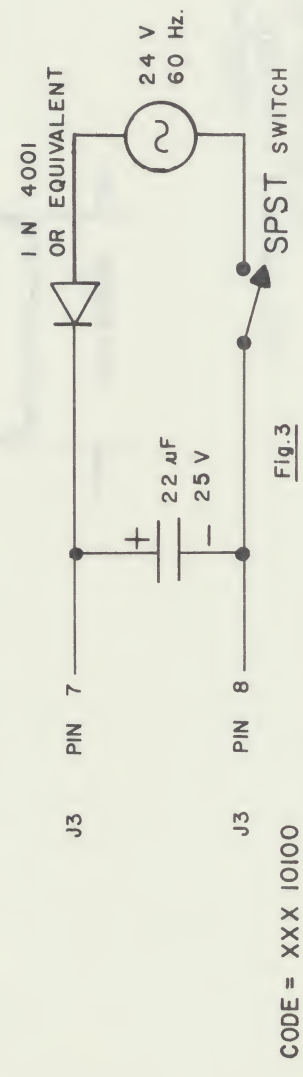
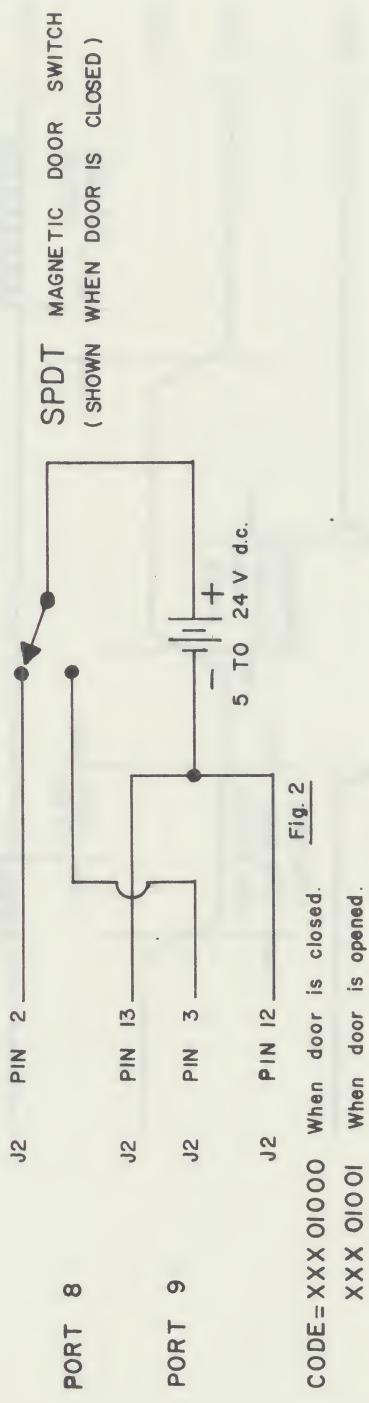
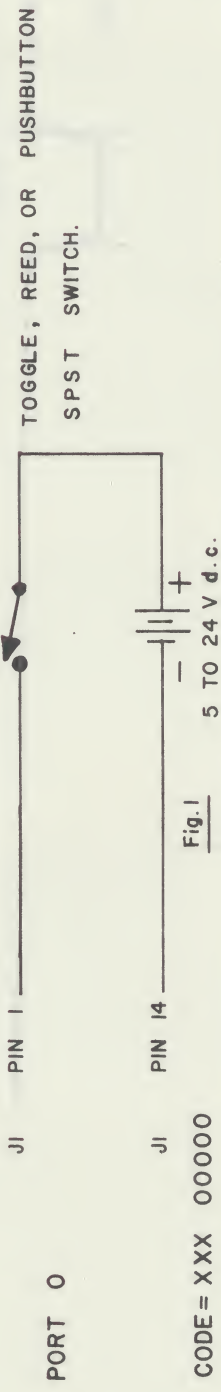
DATA READY will go high if there is data in the buffer (FIFO) and will stay high until **DATA ACCEPTED** strobes low.

VIH (voltage in high): 2.0V min, .04 mA

VIL (voltage in low): .8V max, .40 mA

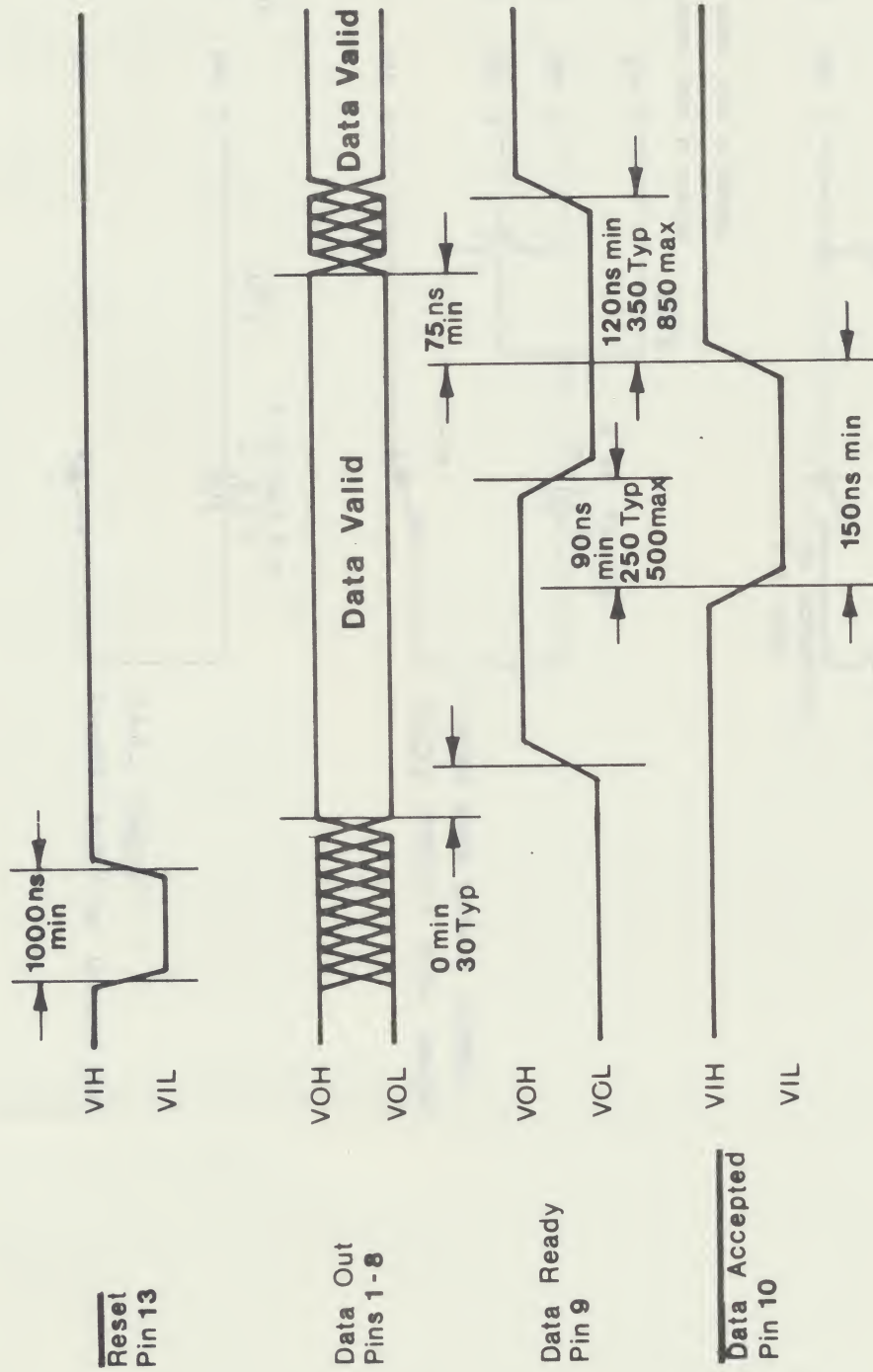
VOH (voltage out high): 2.4V min, 2.6 mA

VOL (voltage out low): .5V max, 16.0 mA

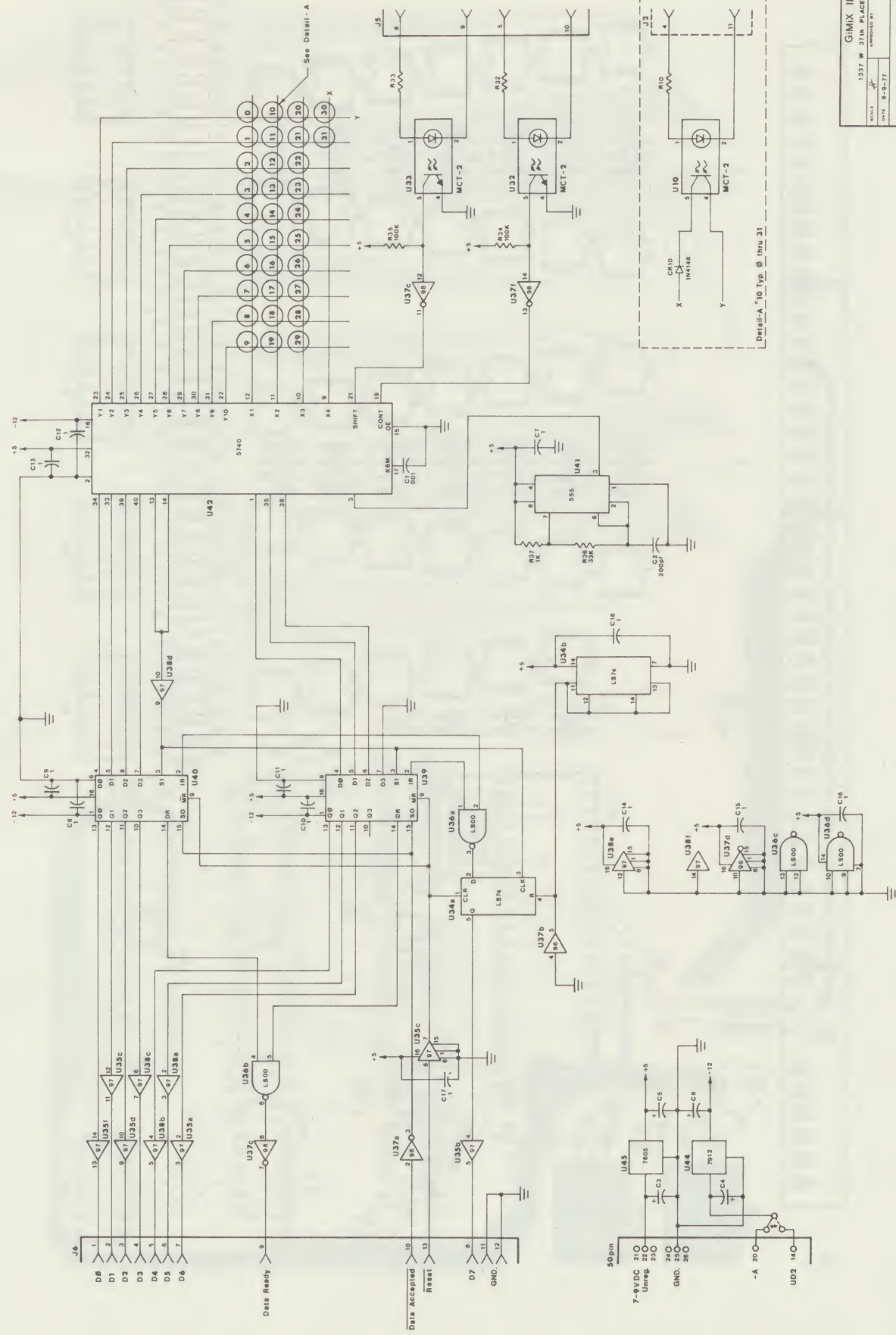


GIMIX INC.	
1337 W. 37th PLACE, CHICAGO, IL. 60609.	
SCALE: <i>HY</i>	APPROVED BY: <i>HY</i>
DATE: 9-7-77	DRAWN BY: MCO
REVISED:	
SWITCH CONNECTION EXAMPLES (Opto Board).	
DRAWING NUMBER L240023 A	

OPTO BOARD Data Output & Hand Shake Timing



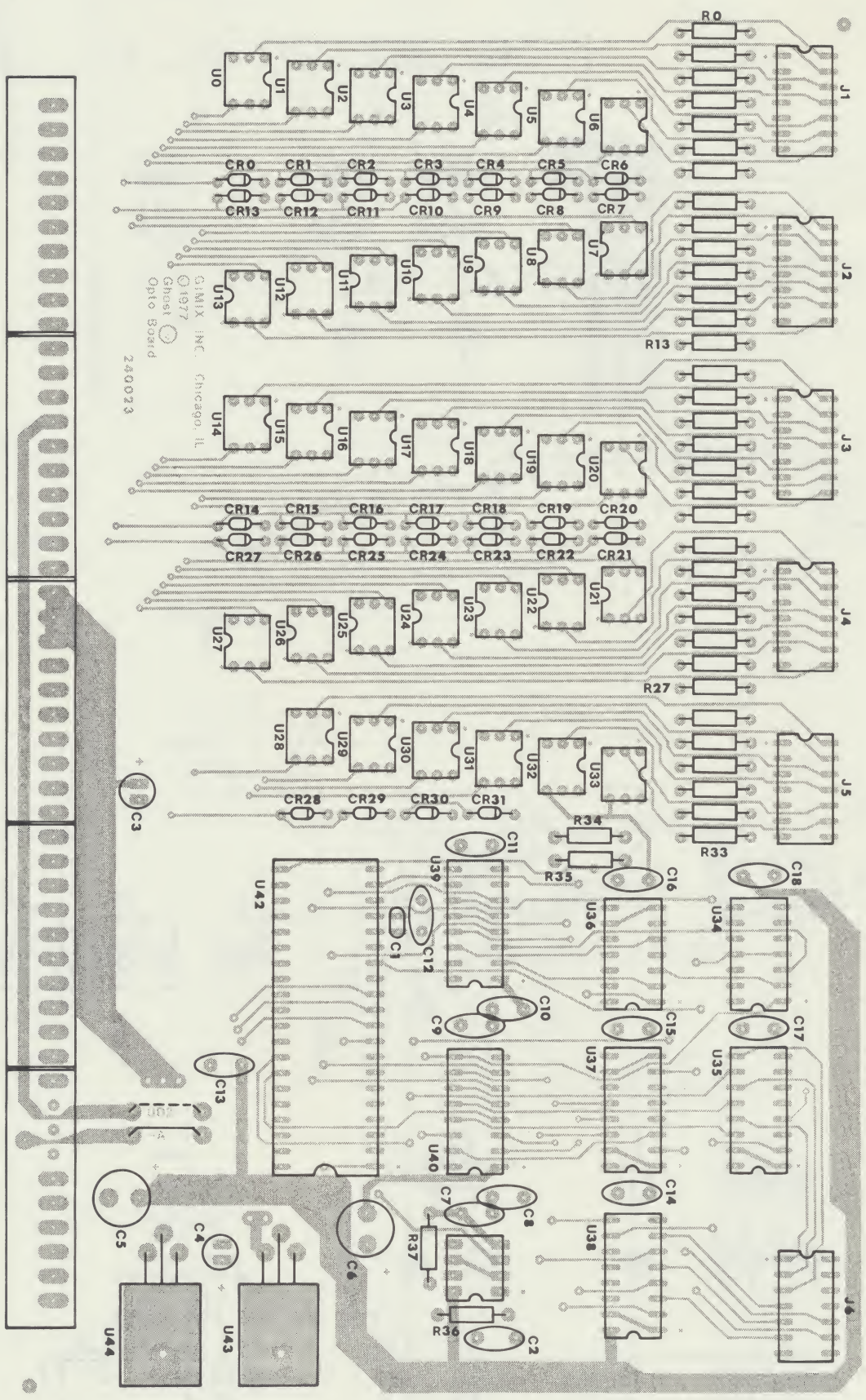
Notes: All times are in nanoseconds.
RESET Min pulse width 1000 ns = 1 micro sec.
DATA ACCEPTED Min pulse width 150 ns.
DATA ACCEPTED must be high for DATA READY to return high.
DATA OUT will not change until DATA ACCEPTED goes low and then returns high (strokes low).
DATA READY will go high if there is data in the buffer (FIFO) and will stay high until DATA ACCEPTED strobes low.
 VIH (voltage in high): 2.0V min, .04 mA
 VIL (voltage in low): .8V max, .40 mA
 VOH (voltage out high): 2.4V min, 2.6 mA
 VOL (voltage out low): .5V max, 16.0 mA



GIMIX INC	
1337 W 37th PLACE CHICAGO, IL 60608	
DATE	APPROVED BY
8-9-77	REVIEWED
OPTO BOARD	
LOGIC DIAGRAM	
L24-0013	



COMP. SIDE



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Ghost
Opto Board
240023

RELAY DRIVER BOARD -- INSTALLATION NOTE

If the line from the board to the processor is excessively long, or if the wire is too thin, the loop current might be low enough to increase response time of the serial interface at the processor. This would cause erroneous status responses at baud rates above 300, e.g. an ON relay would be reported as OFF.

To avoid this problem, make sure that the loop current is at least 20 MA. Some serial interfaces might require 30 MA, especially at higher baud rates.

RELAY DRIVER BOARD

The GIMIX GHOST Relay Driver Board is designed to drive up to 31 General Electric RR8 relays (or equivalent). It gives a micro-processor remote control over any power circuit rated up to 250V, 20A. The Relay Driver Board is especially suitable for residential and industrial applications, such as light dimming, night lights, burglar alarms, television and stereo sets, sprinklers, garage doors and thermostat controls.

The Relay Driver Board allows the use of manual override switches. This, together with operator-initiated commands at the processor console, provides the user with the complete spectrum of fully automated to fully manual operation.

The Relay Driver Board complements other members of the GIMIX power control and sensing family: the GIMIX GHOST Opto Board, and the GIMIX 2-Wire Tone Receiver Board.

FEATURE HIGHLIGHTS

- Up to 31 relays (G.E. RR8--20amp.) driven by one board.
- Up to 4 boards (124 relays) connected to one processor port (20 ma current loop).
- Board-generated relay status allows processor to detect faulty relays and use of manual override switches.
- User-selected parity, number of stop bits, and baud rate (150-300-600-1200).
- High speed; approx. 120 relays activated in 1 sec. (at 1200 baud).
- Low power consumption (40 ma standby, 500 ma max.).
- Small size (24x5x1 in.), fits comfortably into standard electrical boxes.

FUNCTIONAL DESCRIPTION

The Relay Driver Board operates in either the active mode or the scan mode, as directed by the processor. While in the active mode, the board interprets data received (one 8-bit word) as a command to turn on or off a particular relay. After a time sufficient for the relay mechanism to act and for switch debouncing, the board senses the same relay. It then responds to the processor with that relay's number and status (on or off), but only if responses are enabled (switch 3 of U10 is ON). If the status is other than expected, the processor may take appropriate action (repeat the command, notify the system operator, etc).

A command received while in the scan mode has the same consequences except for relay activation, thus providing a convenient way of checking relay status.

A command to turn on (or off) port number 31 results in scan mode being turned on (or off). A mode status response follows, if enabled by switch setting.

If the board's UART detects a transmission error (parity, framing, or overrun), no relays are activated, and no status scan takes place. An error response is sent if switches 3 and 4 of U10 are both on: this consists of the most recent status sensed by the board prior to the error.

Processor commands and board responses have format BB A RRRRR. The high-order bits BB stand for the board number (one of 0,1,2,3). Bit A means ON if 1, OFF if 0. Bits RRRRR represent a relay number (0-30), or the scan mode (31). The following examples illustrate typical commands and responses (if enabled).

- (a) 01 1 11111 = turn on scan mode on board 1
01 1 11111 = response (if enabled)
- (b) 11 0 11111 = turn off scan mode on board 3
11 0 11111 = response (if enabled)
- (c) If in active mode:
00 1 00101 = turn on relay 5 on board 0
00 1 00101 = normal response (relay is on)
00 0 00101 = unexpected response (relay did not operate, or is not installed, or lacks a status wire)
- (d) If in scan mode:
10 x 00000 = what is status of relay 0 on board 2?
10 1 00000 = normal response (relay is on)
10 0 00000 = normal response (relay is off)

INSTALLATION - DATA LINK & POWER

The processor must be equipped with a TTY-compatible (20 ma current loop) serial interface adapter. Connect up to four boards to one port, as shown in Fig. 1.

Set switches 1 and 2 of DIP switch bank U 10 for the desired board number (note that switch 2 is high-order):

Board Number Desired		Switch 2	Switch 1
Decimal	Binary		
0	00	ON	ON
1	01	ON	OFF
2	10	OFF	ON
3	11	OFF	OFF

All boards on the same port must have distinct numbers.

Set switches 3 and 4 of U10 for desired response capability:

Switch 3 OFF - all responses disabled.

Switch 3 ON, Switch 4 OFF - respond with current status (relay or mode) if command was error free; no response if transmission error.

Switch 3 ON, Switch 4 ON - respond with current status if no error; respond with previously sensed status if transmission error.

NOTE: If two or more boards share one processor port, error response should be disabled (switch 4 OFF) for all of them. Otherwise, a noisy line might cause all boards to send at once, confusing the processor.

Set desired baud rate by turning ON one only of switches 4-7 of bank U9:

<u>Switch</u>	<u>Baud</u>
4	150
5	300
6	600
7	1200

Set switches 1-3 of U9 as follows:

Switch 3 OFF -- no parity bits

Switch 3 ON, Switch 1 OFF -- even parity

Switch 3 ON, Switch 1 ON -- odd parity

Switch 2 ON for 1 stop bit, OFF for 2 stop bits

IMPORTANT NOTE

ALL BOARDS ON THE SAME PORT MUST BE SET FOR THE SAME PARITY, NUMBER OF STOP BITS, AND BAUD RATE.

Connect terminals 5 and 6 of TB1 to 24 V ac, 500 ma, 50-60Hz;
connect terminals 1-4 to transmission line, as in Fig. 2.

INSTALLATION -- RELAYS AND SWITCHES

Use Fig. 2 to identify relay ports. Each port consists of six adjoining terminals in a terminal block, as illustrated in Fig. 3. (The status terminal is not connected if a RR7 relay is used).

Manual override switches may be connected to relays or groups of relays. Some possible configurations are shown in Fig. 4. Note that any switch must be rated for the number of relays it is to control.

GENERAL ELECTRIC RR8 RELAYS

The GE RR8 relay is mechanically latched, thus requiring only 1/120 sec. current pulse to turn on or off. It is rated as follows (at up to 140 degrees F):

1/2 HP, 125 V ac

1½ HP, 250 V ac

20 A, 125 or 277 V ac for tungsten, fluorescent, or inductive loads. The operating requirement is 24V (20 minimum) ac or half-wave rectified ac; .28 A maximum at 24 V ac.

The GE RR7 relay may also be used - it is the RR8 without the status sensing (yellow) wire.
Contact General Electric for more details.

ONE BOARD

FIG. 1

FIG. 4A

FIG. 2

FIG. 4B

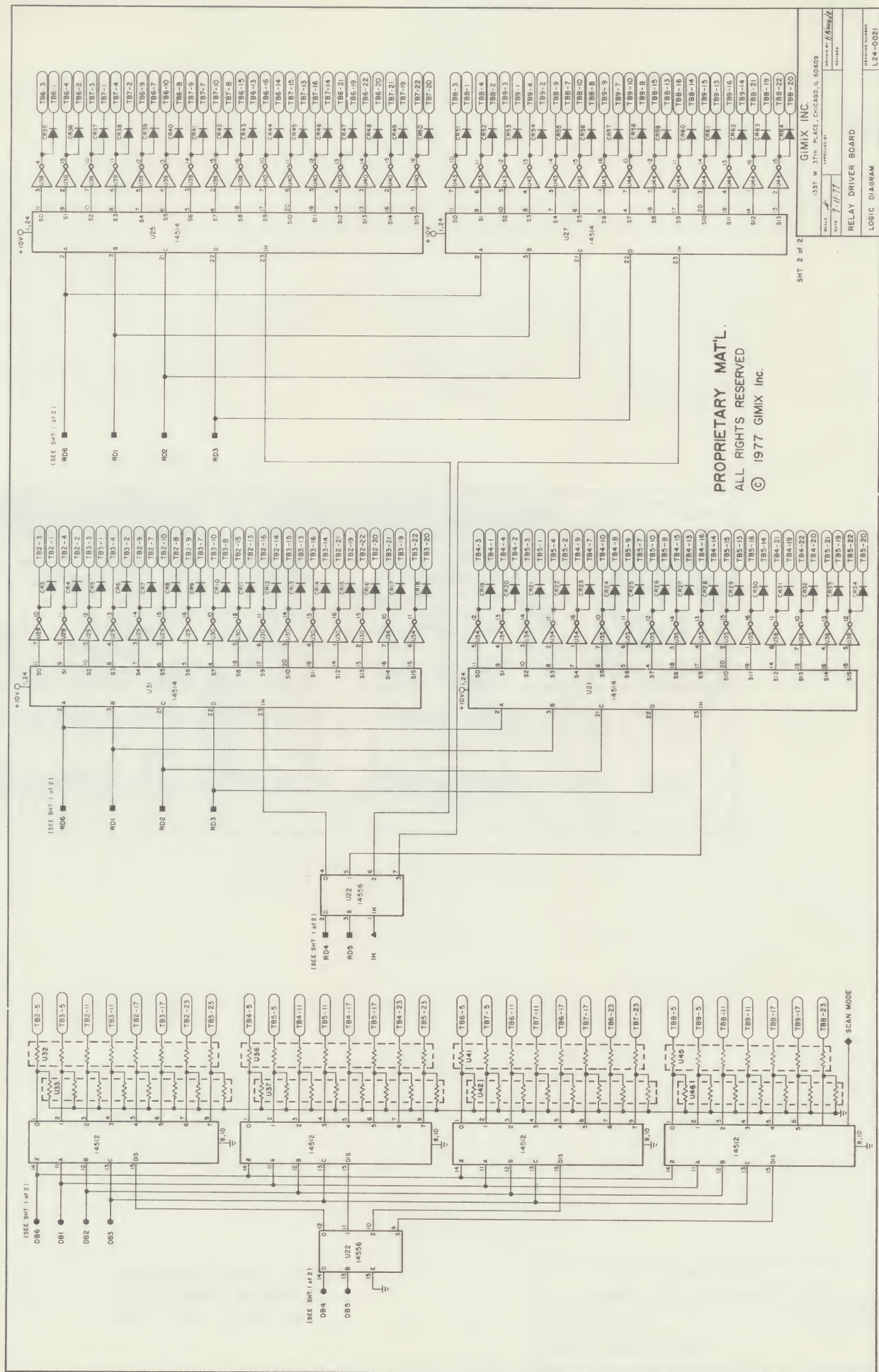
TERMINAL BLOCK 2

FIG. 3

FIG. 4C

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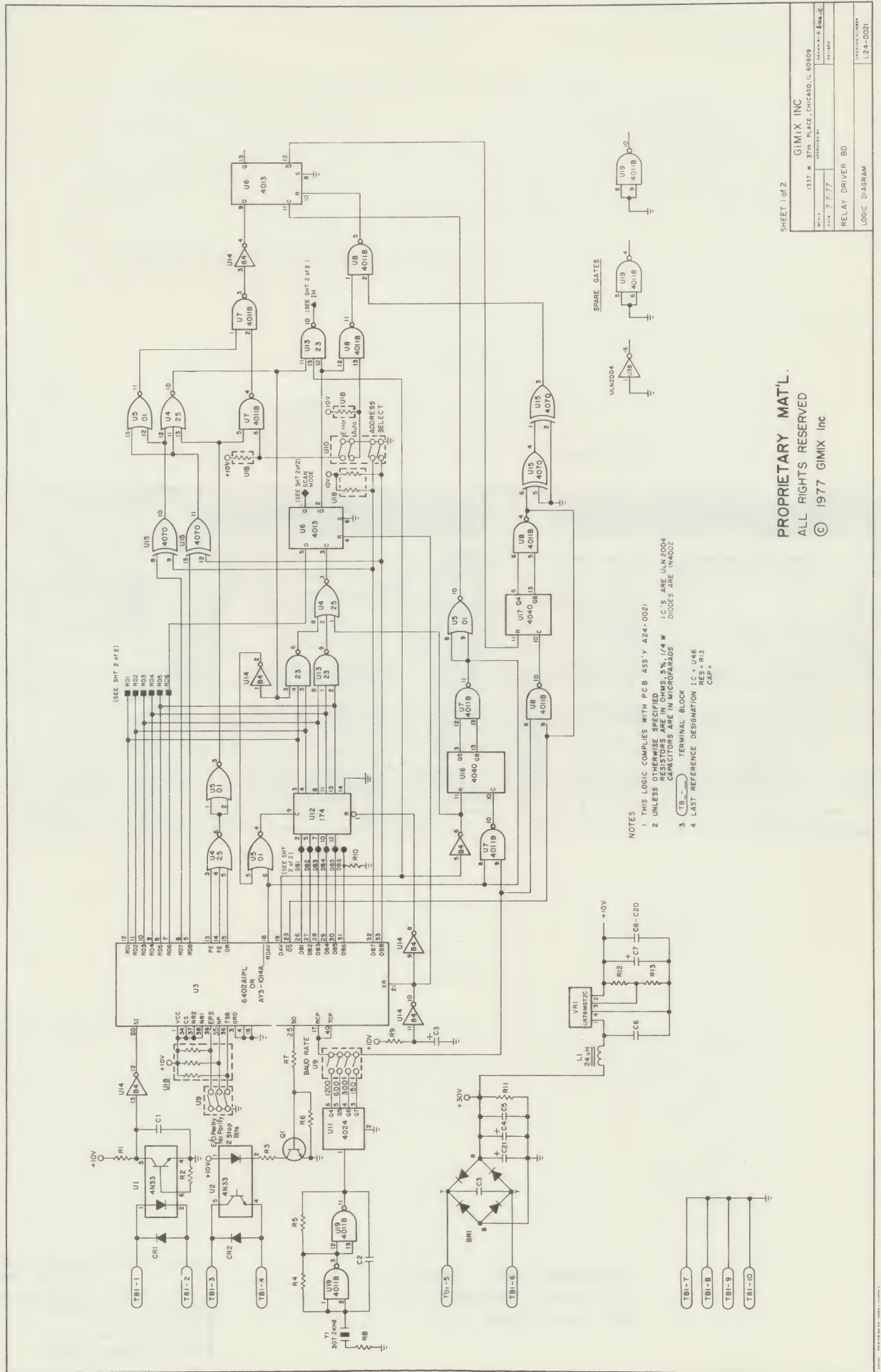
1337 W 37th PLACE, CHICAGO, IL 60609 GiMIX INC.	
NAME <u>TH</u> DATE: <u>9-30-77</u>	APPROVED BY: SIGNED BY <u>MC O</u> KEY-1000
RELAY DRIVER BOARD	
QUANTITY ORDERED 24-00-21	



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GIMIX INC.	
137 W. 5TH PLACE, CHICAGO, IL 60609	DESIGNED BY: <i>W. H. H. H.</i>
DATE: <i>7/1/77</i>	REVISED:
RELAY DRIVER BOARD	
LOGIC DIAGRAM	
DRAWING NUMBER: L24-0021	

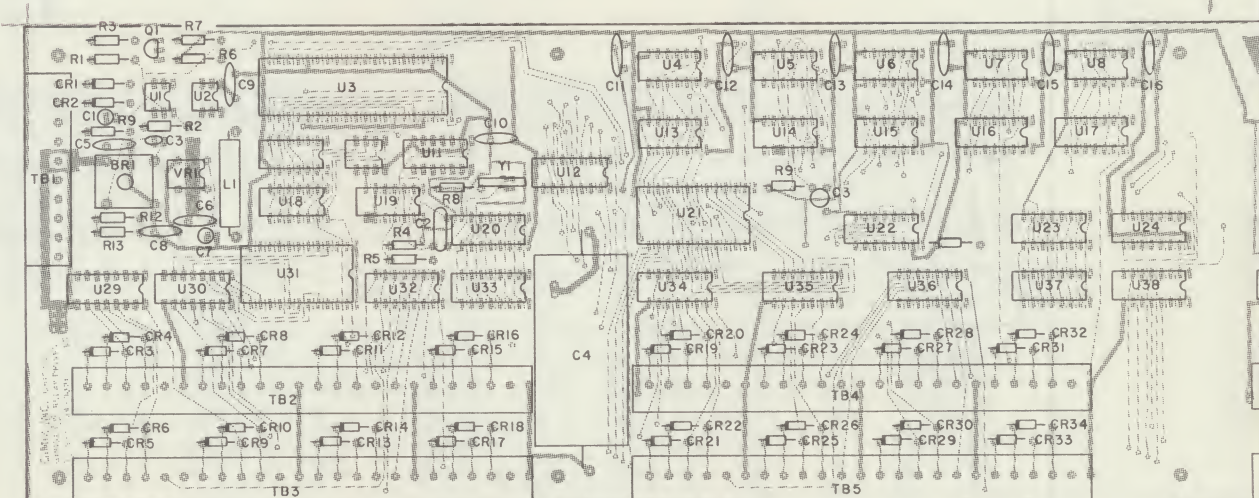
SHT 2 of 2



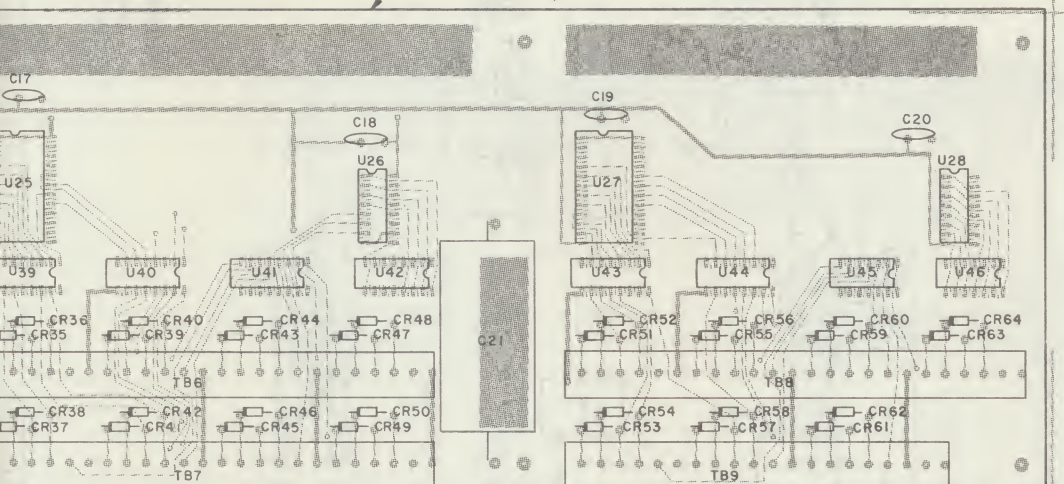
SHEET 1 of 2

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GIMIX INC	
1337 W 37th PL, CHICAGO, IL 60609	
DESIGNED BY	DATE 7/77
REVIEWED BY	DATE
RELAY DRIVER BD	
LOGIC DIAGRAM	
L24-0021	



P.C.B. 24-0021



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GiMiX INC.		
1337 W 37th. PLACE, CHICAGO, IL 60609		
SCALE: 2 = 1	APPROVED BY:	DRAWN BY: <i>H. Wong</i>
DATE: 7-22-77		REVISED
RELAY DRIVER BOARD		
ASS'Y DWG.		DRAWING NUMBER 24-0021

GIMIX VIDEO BOARD INSTRUCTION

The Gimix Video Board plugs directly into your SWTPC 6800 Computer. It is a high speed direct access video output display device, which connects to any video monitor, or modified T.V. It displays upper case only ASCII characters in a format of 32 characters per line by 16 lines for a total display of 512 characters (factory standard), or 64 characters per line by 16 lines for a total display of 1024 characters (user selectable). Each and every character which can be displayed has its own particular address to your CPU. The board contains 1 K bytes of 500 ns RAM which lets you instantly change, rewrite or update all 1024 characters (64 x 16 format), and does it faster than you can blink.

Normally the on board 1 K memory is continuously being accessed by the video generator as it refreshes the display. When the CPU accesses the on board memory the display is momentarily blanked, and shows up on the display as black static for the duration of the access.

Memory addresses correspond to screen positions as follows: The upper left hand corner is 00. Addresses increase by one going from left to right, and by 32 from top to bottom (64 for the 64 x 16 display). The upper right hand corner is 31 (63), the lower left hand corner is 480 (960), and the lower right corner is 511 (1023).

Therefore, with the board configured for the 32 x 16 and addresses to D000 (hex), the address of the upper right corner would be D01F (hex). To display the character "F" there, load an accumulator with the ASCII value of "F" (hex 46) and store the accumulator at D01F.

When the board is configured for the 32 x 16 display the lower 512 bytes of on board memory are used for refreshing the display. The upper 512 bytes are not used by the display, but are still accessible by the CPU. Accessing this memory will cause black static.

The 64 x 16 display uses the entire 1K of memory. To convert to this configuration, refer to the assembly drawing for the location of the six paths to be cut and jumpered. You must adjust the character density trimpot.

There are 2 trimpots at the top of the board. The left one controls the character density of the display. This can be adjusted to fit the width of your particular monitor. The right trimpot positions the left hand margin.

The character set is upper case only, consisting of ASCII characters 32-95 (dec). However the 2513 type character generator used does not decode the seventh bit, so the values 0-31 display the same as 64-95, and the values 96-127 display the same as 32-63. If the eighth bit is a "1", the video generator ignores the character generator and displays a solid block, which can be used as a cursor or graphics element. If all 1K of on-board memory had bit 8 set to a "1" then the entire display will be filled with white blocks.

To select the starting address for the board, refer to the assembly drawing for the location of the address select pads. The board comes factory strapped to address D000 (hex). To strap to a different address connect the six jumpers to the appropriate pads as shown on the assembly drawing.

The voltage and current requirements are approximately 700 ma @8vdc un-reg., and 40 ma @-12V. The jumper just below the voltage regulators allows you to disconnect from the - 12 V supply of the bus and connect to UD1 if you want to use your own supply.

GIMIX VIDEO DISPLAY DRIVER ROUTINE

/ THIS ROUTINE DISPLAYS THE
/ CHARACTER CONTAINED BY ACCA
/ AT THE CURSOR LOCATION. IT
/ IGNORES ALL LOWER CASE CHAR-
/ ACTERS, AND ALL CONTROL CHAR-
/ ACTERS EXCEPT CR. IF THE CUR-
/ SOR MOVES OFF THE BOTTOM OF
/ THE SCREEN, ALL THE TEXT ON
/ THE SCREEN WILL BE SCROLLED
/ UP 1 LINE.

/ THIS ROUTINE IS FULLY RELO-
/ CATABLE, AND MAY BE PUT IN
/ PROTECTED MEMORY OR PROM.
/ IT DOES NOT AFFECT ACCA OR
/ ACCB, BUT WILL DESTROY IX.

/ MEMORY USAGE:
/ THE VIDEO BOARD HAS 1K OF
/ RAM WHICH THE ROUTINE ASSUMES
/ IS AT (HEX) D000. D000-D1FF
/ IS THE 32 X 16 DISPLAY. D200-
/ D3FF IS PRESENT REGARDLESS OF
/ THE DISPLAY SIZE.
/ THE CURSOR LOCATION IS STORED
/ IN 1C-1D (24-25).

/ THE ROUTINE USES 84 (54H)
/ BYTES OF MEMORY.

/ TO CONVERT TO 32 X 16,
/ USE THE LINES MARKED "/>
/ TO REPLACE THE LINES
/ JUST BENEATH THEM.

/ SYMBOLS USED IN THIS ASSEM-
/ BLER:

/ "#": IMMEDIATE OPERAND
/ "*": TWO-BYTE IMMEDIATE
/ OPERAND
/ "%": DIRECT ADDRESS
/ "X": INDEXED ADDRESS
/ "@": RELATIVE ADDRESS

/ ALL NUMERIC VALUES ARE GIVEN
/ IN HEXADECIMAL NOTATION

/ PREFACE ROUTINE
/ SAVES & RESTORES ACCB

P PSHB
 BSR @A
 PULB
 RTS

/ TEST FOR CONTROL CHARS

A BITA #E0

BEQ @C

/ TEST FOR BIT 8 = 1

BMI @Z

/ TEST FOR LOWER CASE LETTERS

CMPA #60

BGE @Z

/ DISPLAY CHARACTER

LDX %1C

STAA X00

INX

STX %1C

BRA @T

/ TEST CONTROL CHAR FOR CR

C CMPA #0D

BNE @Z

/ CARRIAGE RETURN ROUTINE

LDAB %1D

/>ANDB #E0

ANDB #C0

/>ADDB #20

ADDB #40

STAB %1D

LDAB %1C

ADCB #00

STAB %1C

/ LOAD IX FOR TEST

LDX %1C

/ TEST FOR CURSOR OFF BOTTOM

/>T CPX *D200

T CPX *D400

BNE @Z

/ SCROLL TEXT UP 1 LINE

LDX *D000

/>S LDAB X20

S LDAB X40

STAB X00

INX

/>CPX *D1E0

CPX *D3C0

BNE @S

STX %1C

/ ERASE LEFTOVER TEXT

/>LDX *D1FF

LDX *D3FF

LDAB #'

E STAB X00

CPX %1C

BEQ @Z

DEX

BRA @E

/ ROUTINE HOMES CURSOR

/ ROUTINE ADDRESS=(P)+4E

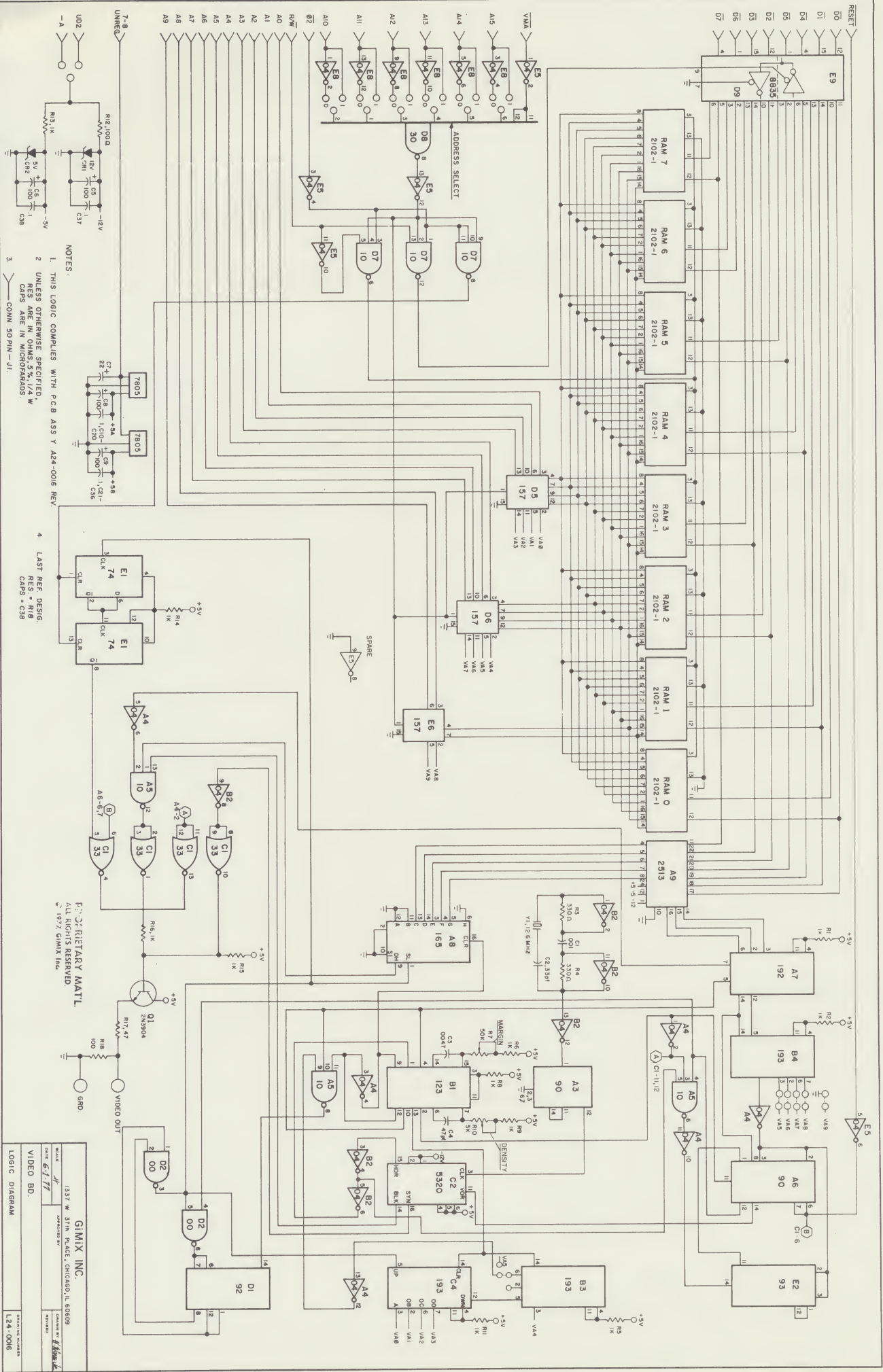
H LDX *D000

STX %1C

Z RTS

GIMIX VIDEO BOARD
PART NO. 24-0016

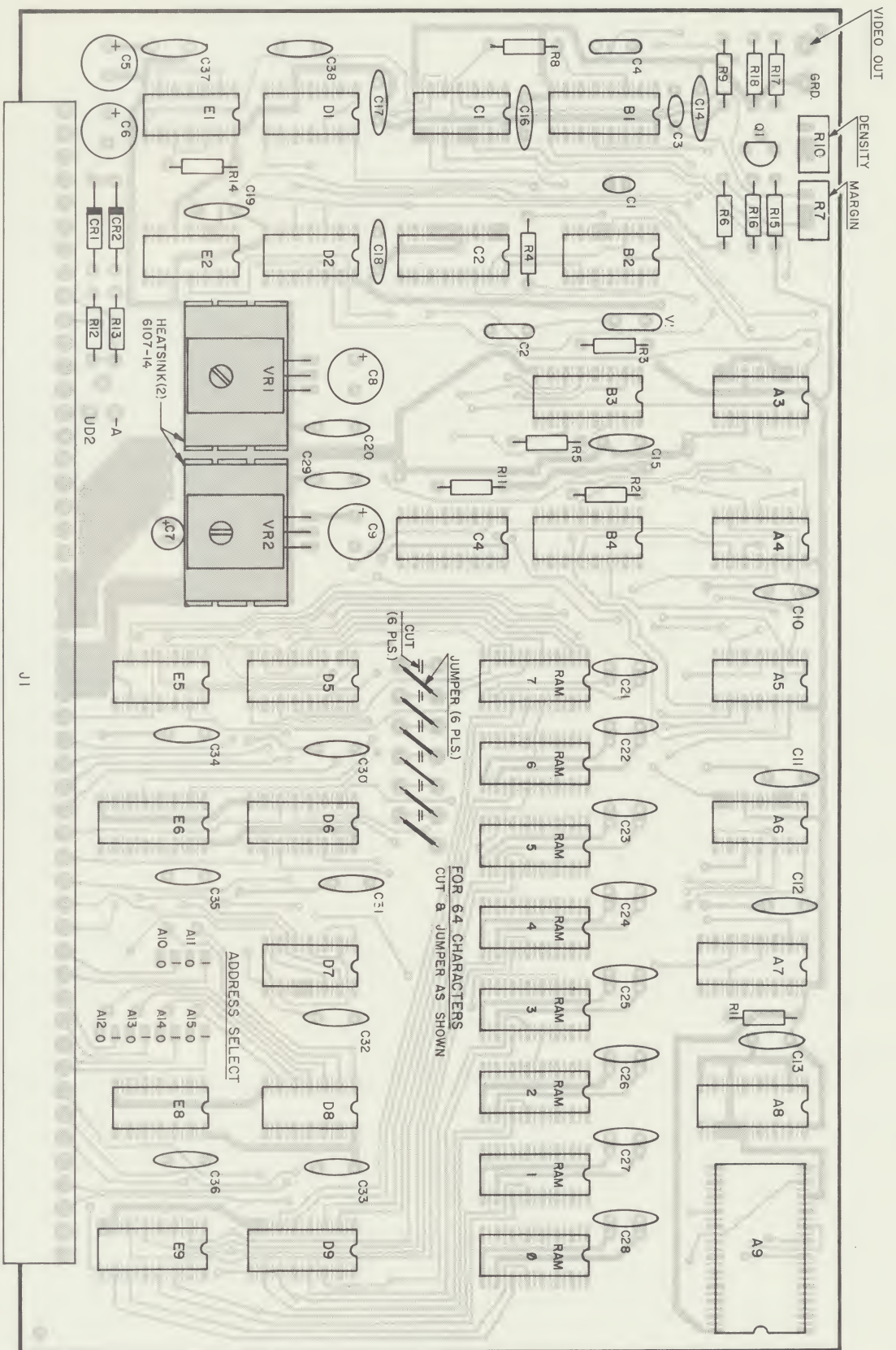
QTY	PART	LOCATION
	INTEGRATED CIRCUITS	
1	74LS00	D2
4	74LS04	A4, B2, E5, E8
2	74LS10	A5, D7
1	74LS30	D8
1	7433	C1
1	74LS74	E1
2	74LS90	A3, A6
1	74LS92	D1
1	74LS93	E2
1	74LS123	B1
3	74LS157	D5, D6, E6
1	74165	A8
1	74LS192	A7
3	74LS193	B3, B4, C4
8	21L02-1	RAM 0 THROUGH RAM 7
1	2513	A9
2	NATIONAL 8835	D9, E9
1	NATIONAL MM5320	C2
9	BURNDY I.C. SOCKETS 16	PIN
1	BURNDY I.C. SOCKETS 24	PIN
	RESISTORS $\frac{1}{4}$ WATT 5%	
11	1K Ω	R1, R2, R5, R6, R8, R9, R11, R13, R14, R15, R16
2	330 Ω	R3, R4
2	1000 Ω	R12, R18
1	47 Ω	R17
1	5K Ω	R10
1	50K Ω	R7
	CAPACITORS	
1	.0047 MYLAR	C3
1	.001 MYLAR	C1
29	.1 DISC.	C10 THROUGH C38
1	22 MFD. ELECT.	C7
1	33 PF MICA	C2
1	47 PF MICA	C4
4	100 MFD.ELECT.	C5, C6, C8, C9
	DIODES, ZENER	
1	12 V. 1 W.	CR1
1	5 V. $\frac{1}{2}$ W.	CR2
1	TRANSISTOR Q1 2N3904	
1	CRYSTAL-TYCO 12.6 MHZ	V1
2	VOLTAGE REGULATOR 7805	VR1, VR2
2	THERMALLOY HEAT SINK 6107-14	
1	ABLE PLUG ASSEMBLY PL 259 W 4 COAX	
5	MOLEX CONNECTOR 10 PIN J1 NO.09-52-3101	
2	SCREWS NO.4-40 5/16" LONG	
2	NUTS NO.4-40	



- NOTES:
1. THIS LOGIC COMPLETES WITH P.C.B. ASSY A24-0006 REV.
 2. UNLESS OTHERWISE SPECIFIED, RES. ARE IN OHMS, 5%, 1/4 W. CAPS. ARE IN MICROFARADS.
 3. CONN. 50 PIN - J1.
 4. LAST REF. DESIG. RES. = R18 CAPS. = C38

PROPRIETARY MATL.
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GIMIX INC.	
1337 W. 37TH PLACE, CHICAGO, IL 60609	
DATE: 6-1-77	DESIGNED BY: R. J. HARRIS
VIDEO BD.	REVIEWED BY: R. J. HARRIS
LOGIC DIAGRAM	
CIRCUIT NUMBER: L24-0006	



NOTE:
 1. FOR LOGIC DIAGRAM SEE L24-0016.
 2. LARGER PADS FOR LOCATING COMPONENTS.
 3. ASSEMBLED BOARD SHALL CONFORM TO GIMIX WORKMANSHIP STANDARDS.

GIMIX INC.		1337 W. 37th PLACE, CHICAGO, IL 60609	
SCALE	2X	APPROVED BY:	
DATE	6-1-77	DRAWN BY:	H. H. H. H.
VIDEO BOARD		REVISED	
ASS'Y	DWG.	DRAWING NUMBER	24-0016

16K PROGRAM-CONTROLLABLE RAM

The GIMIX GHOST 16K Static RAM Board contains 16384 8-bit words of read/write memory, with 450 nanosec access time, organized in four 4K blocks. The use of TMS 4044-45 fully static chips eliminates the need for refresh processor commands or circuitry--data is retained as long as power is on. Each block is controlled by its own control register: by storing one word of data in the register, the processor may place the block at any 4K-boundary, or disable the block, or enable it in either read/write or read-only mode. This gives the system a virtually unlimited memory, far beyond 65K.

Each block also has its own bank of DIP switches for block address, block enable, and read/write mode. If desired, the block may be controlled through switches only.

The board plugs into an SS50 mother board. Typical current required is 1.6A; four voltage regulators and heat sinks are included. All address and data lines are buffered.

CONTROL USING SWITCHES ONLY

Turn OFF switch 3 of bank S6 (the register enable switch). Each block is now controlled by its switch bank: Switch 1 may be turned ON to enable the block; when it is OFF the block, in effect, ceases to exist (but data is retained and may be read when the block is enabled again). Switch 2 may be turned ON for read/write, turned OFF for read-only mode. Switches 3-6 may be set for the desired block address, corresponding to address lines A12-15 (any 4K boundary).

For example, if block 0 is to be enabled for read-only at 1000, set bank S0 as follows:

1	2	3	4	5	6
on		on	on	on	
	off				off

ACCESSING REGISTERS

Turn ON the register enable switch, and set the other switches of banks S4,5,6 for the desired address (any 4-word boundary). Note that the switches correspond to address lines A2-15 (also see assembly drawing). Each register is addressed like any memory location. For example, to enable the registers at 8020: turn ON switch 3 of S6; turn OFF switches 2 of S6 and 5 of S4; turn ON the remaining switches of S4 and S5. Instruction LDAA \$8020 would now result in reading register 0 (i.e. the register controlling block 0), while STAA \$8023 would now store data in register 3.

A register is a 6-bit latch, each bit controlling a block address bit or mode:

register bit:	5	4	3	2	1	0
controls:	block	read/	A15	A14	A13	A12
	enable	write				

The two high-order bits are ignored in store operations, e.g. a register is cleared by storing 00 as well as 40, 80, or C0. In load operations they assume the system default value, e.g. a cleared register will be read as 00 or C0.

Power-on or system reset clears all registers to zero.

CONTROL USING REGISTERS ONLY

Set banks S0-3 as follows: switch 1 is OFF, switches 2-6 are ON in each bank. Turn ON the register enable switch, and set banks S4,5,6 for the desired register address. Reset the system to clear registers. Each block is now disabled. The following instructions illustrate register control of memory blocks (assuming that registers are at 8020).

LDAA	#\$25	block 0 enabled at 5000
STAA	\$8020	in read/write mode
LDAA	#\$3A	block 1 enabled at A000
STAA	\$8021	in read-only mode
LDAA	\$8020	block 0 placed in
ORAA	#\$10	read-only mode
STAA	\$8020	
LDAA	\$8021	block 1 placed in
ANDA	#\$EF	read/write mode
STAA	\$8021	
LDAA	\$8020	disable block 0 (but retain
EORA	#\$20	mode and address bits)
STAA	\$8020	
CLR	\$8021	disable block 1 (reset all bits)

CONTROL USING REGISTERS AND SWITCHES

Some applications might require one or more blocks to be enabled immediately after a reset. This is possible, since the status of a block is determined by both its switches and the contents of its register, according to the following rules.

1. Power-on or system reset clears all registers to zero.
2. Block enable is the logical XOR-INVERT of switch 1 and bit 5.
3. Write enable, or any address bit, is the logical OR of the corresponding switch and register bit.

Rules 2 and 3 restated in tabular form:

		bit 5		bit 4		bit 3		
		0 1		0 1		0 1		
switch 1	ON	en dis	switch 2	ON	R/W R	switch 3	ON	A15=0 A15=1
	OFF	dis en		OFF	R R		OFF	A15=1 A15=1

Note some consequences of these rules:

- (a) After power-on or system reset, block status depends on switch setting only.
- (b) A change in bit 5 always changes the block from enabled to disabled, or vice versa.
- (c) Bit 4 controls write-enable only if switch 2 is ON.
- (d) A register bit controls an address bit only if the corresponding switch is ON, e.g. A12=0 only when switch 6 is ON and register bit 0=0.
- (e) The register has the greatest amount of control over the block when switches 2-6 are all ON.

EXAMPLE

Assume that the registers have been enabled and placed at C000, i.e. switches 1 and 2 of S6 are OFF, switch 3 of S6 and all switches of S4,5 are ON. Banks S0-3 have been set as follows:

S0						S1						S2						S3					
1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on	on
off						off						off	off									off	off

That is, blocks 0,1,2 are at 0000 and disabled; blocks 0,1 are write-enabled; block 2 is read-only; block 3 is at 3000, enabled, and write-enabled. Note that this is a true description of block status after reset (registers are clear) or if registers are disabled; subsequent processor action will change status as illustrated below.

LDAA \$C000 accumulator contains 00 or C0,
normal contents of control register
after reset

LDAA #\$20 bit 5 is set to disable block 3
STAA \$C003 (since switch 1 is on)

LDAA \$C001 bit 4 is set to force
ORAA #\$10 block 1 in read-only
STAA \$C001 mode

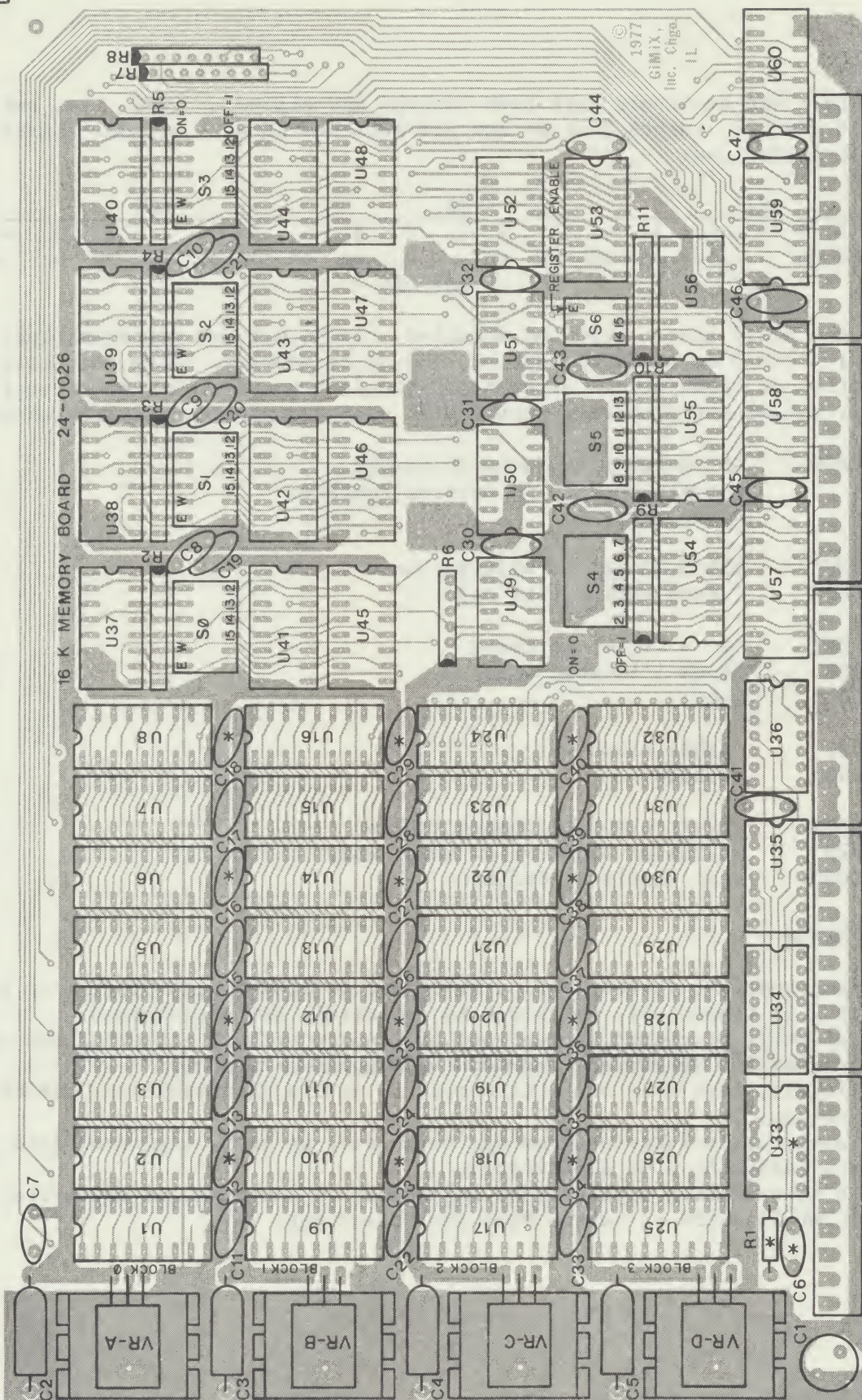
LDAA #\$20 enable block 0
STAA \$C000 at 0000

LDAA \$C000 invert bit 5 to change enable
EORA #\$20 status of block 0; in this case,
STAA \$C000 from enable to disable

APPLICATION HINTS

1. During software development, a block can be loaded with program or data. If its switch 2 is turned off, the block is positively write-protected.
2. A defective block can be replaced by a spare without affecting the application, provided the supervisor contains a diagnostic routine.
3. Typically, less than one millisecond is needed to disable one set of blocks and enable another.
4. An arbitrarily large program can be loaded, if it is segmented into pages of 64K or less (assuming a 4K supervisor).
5. In a time-sharing application, any number of programs can be on-line, with less than one millisecond to switch from one to another.

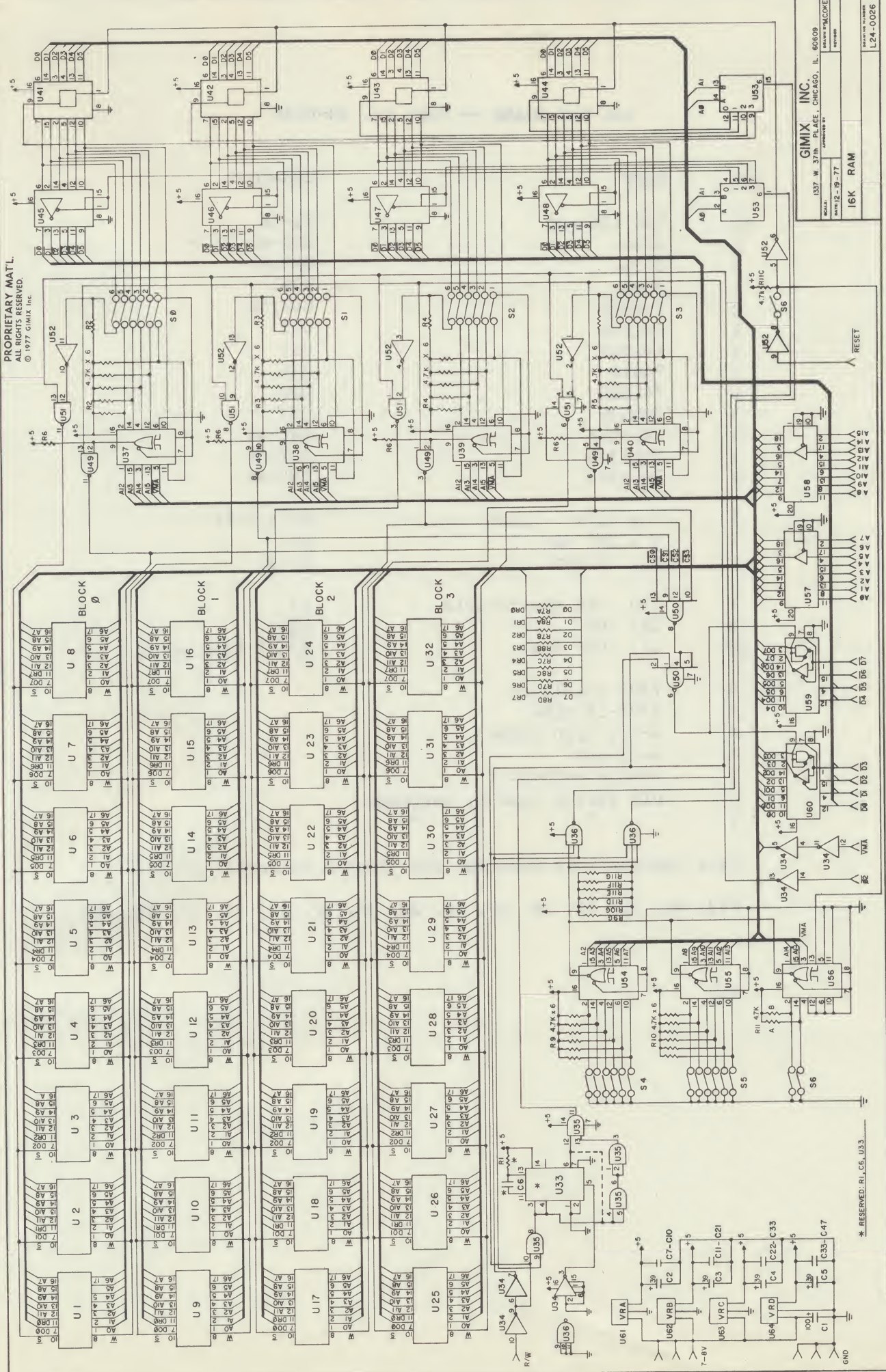
TOP



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GIMIX INC.
1337 W. 37th PL. CHICAGO, IL 60609
BRAND NAME: GIMIX
DATE: 12-19-77
REVISION: 1
16K RAM
TRANSMISSION NUMBER: L24-0026

* RESERVED: R1, C6, U33

16K RAM BOARD -- Part no. 24-0026

QTY	PART	LOCATION
32	TMS 4044-45	U1-32
7	8136	U37-40, 54, 56
2	8835	U59, 60
1	8T98	U34
2	74LS00	U49, 51
1	74LS04	U52
1	74LS08	U35
1	74S10	U36
1	74LS20	U50
1	74S139	U53
4	74LS174	U41-44
2	74LS244	U57, 58
4	74LS368	U45-48
7	7 x 4.7k pack	R2-5, 9-11
1	5 x 680 ohm "	R6
2	4 x 33 ohm "	R7, 8
1	100, 16V electrolyte	C1
4	39, 10V	C2-5
29	.1, 100V disc	C7-47 (see note)
4	7805 regulator	
4	6107-14 sink	
4	4-40, 5/16 screw	
4	4-40 nut	
1	50-pin connector	
6	DIP switch bank 6, switches	
1	" 3 "	

Part designations reserved for future options:

U33, R1, C6, 12, 14, 16, 18, 23, 25, 27, 29, 34, 36, 38, 40